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ABSTRACT

Presented is the final report of a Title III research project to determine the education status of 58 elementary school children with mild hearing loss and to devise a management package that could be utilized by a regular classroom teacher. Sections address the following project components: goals (including comparison of three treatment procedures--audio-visual program, FM transmitter, and teacher counselor service); subjects; testing procedure (which included the Wide Range Achievement Test and speech discrimination testing); treatment procedures (detailed descriptions of the audio-visual units and FM wireless transmitters); and academic achievement (a report on data obtained from monitoring Ss). Among conclusions are that a hearing loss may only cause communication problems and not interfere with learning; that hearing loss may be considered a cause of poor achievement; and that classroom teachers are in the best position to assess the hearing loss factor. Appendixes include management guides which cover such areas as introduction of wireless FM systems to a regular classroom teacher; a summary of questionnaire responses from parents and regular classroom teachers regarding good and poor achievers; and statistical data on test results. (SBH)

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HARD-OF-HEARING CHILD

IN THE REGULAR CLASSROOM

FINAL REPORT

1975

ESEA TITLE III

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Oakland Schools
An Intermediate District of School Administration
2100 Pontiac Lake Road
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Prepared by ESEA Title III Project Staff

Project (0661): THE HARD OF HEARING CHILD

IN THE REGULAR CLASSROOM

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INTRODUCTION:

This is the final report of an ESEA Title III research project entitled, "The Hard of Hearing Child in the Regular Classroom." The project was conducted in Oakland County in the State of Michigan beginning July 1, 1971 and is scheduled to be completed July 1, 1975. The fifty-eight children included in the project were from twenty-one of the twenty-eight school districts in the county. This county included urban, suburban and rural areas and an average distribution of socio-economic factors.

A conference sponsored by the State Department of Education in 1970 provided the setting for the initial generation of ideas that resulted in this research project. That meeting of teacher counselors, consultants, classroom teachers and other special education personnel concluded that some type of programming should be explored for children with mild sensorineural hearing loss who find themselves in regular classrooms. They stressed an emphasis be placed on treatment procedures.

The Michigan Department of Health conducts annual hearing screening in Michigan schools. In 1973-74 some 600,000 children received a hearing test. At least 3% of these children will have some type of hearing loss. Of this 3% at least 1% will have a permanent hearing impairment. At the present time the primary educational treatment for children with mild hearing loss is to notify the teacher that such a condition exists and recommend front seating and lipreading. Typically a child will be referred to an audiology clinic to be tested for a hearing aid if the deafness is severe enough as to be readily apparent to those with whom he comes in daily contact. These procedures have a tendency of avoiding the important question which concerns the "educational" significance of

this deafness and leave the appearance that everything has been done to correct this condition. Interviews with parents of the hard of hearing children included in the project revealed the following:

1. Parents were made aware of the type of deafness by their physician but he was usually not able to pinpoint the cause. This often resulted in parents feeling very uneasy about the reason for the deafness.
   (a) Twenty-three of the forty-four families had a familial history of hearing loss.
   (b) Perinatal history was negative.
   (c) Childhood disease was as expected for children within this age group.
   (d) Rh incompatibility was not a significant factor in this group.

2. The hearing loss was most often detected by the health department screening test in kindergarten and first grade.
   (a) Nursery schools and kindergarten teachers first noted the problem or corroborated parents' suspicions.
   (b) The pediatrician was usually last to find out about the hearing loss and was surprised at this finding.

3. Hearing loss was detected:

   (a) 10 children - 6 years of age

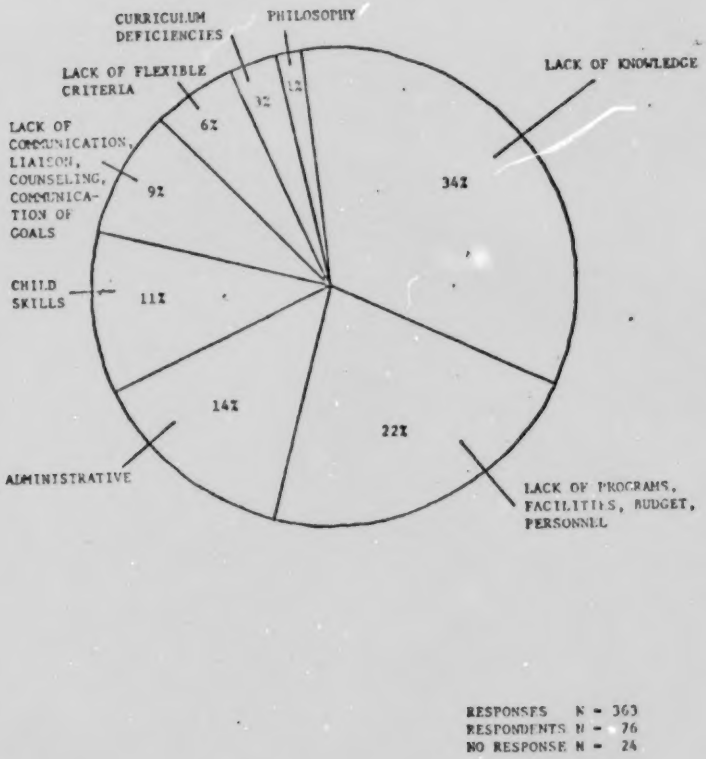
   (b) 18 children - 5 years of age

   (c) 10 children - between 2 and 4 years of age

Obviously parents were often confused by conflicting opinions as to the presence of a deafness and more confused about its significance educationally. For example: an audiologist would recommend a hearing aid, an otolaryngologist would tell the parent not to worry about the hearing loss, a teacher might test the child by calling his name and indicate his hearing was adequate. Evidence exists that a clear-cut procedure following the identification of the hearing loss designed to establish its educational significance frequently does not operate. Professional personnel such as, school nurses, principals, teachers, social workers, hearing aid salesmen, speech therapists, psychologists and others all have an opinion as to the significance of this hearing loss; yet none of these personnel must spend the entire school day teaching the child as does the regular classroom teacher to whom he is assigned. It was with these facts in mind that our project was conducted.

Project "NEED" in Utah has presented a needs assessment profile for children with hearing loss. A primary finding of this study was that a lack of knowledge regarding deafness was a most critical factor when integrating hearing impaired children. (Figure 1).

Figure 1:



Their main conclusion after several years of study, indicates the primary target for programming in the regular classroom is to provide the teacher with more information about the child and his deafness.

GOALS:

The primary target of this project was to determine the education status of children with mild hearing loss and devise a management package that could be utilized by a regular classroom teacher.

The initial goals of this project were as follows:

1. To design and prepare an audio-visual unit, to be viewed by parents and teachers, constructed to further their understanding of the communication needs and learning problems of hard of hearing children.
2. To compare the effectiveness of three procedures designed to enhance the achievement of hard of hearing children in the regular classroom.
3. To apply the most effective procedure in a rural area of this state.

From these initial goals the following performance objectives were derived:

1. Objective 1: At least 70% of the classroom teachers and the parents viewing the audio-visual presentation, "An Experience in Deafness," will exhibit an understanding of what it means to have a hearing impairment by obtaining fewer errors on a post-test than on a pre-test using a project-made instrument.
2. Objective 2: At least 70% of the hearing impaired students that are classified in experimental groups will show improved ability to hear speech in a regular class-

room while using the FM equipment by obtaining at least a 10% gain in speech discrimination test scores. (The test for speech discrimination will consist of the student correctly saying the words which are presented orally by the teacher in a classroom setting from a phonetically balanced word list).

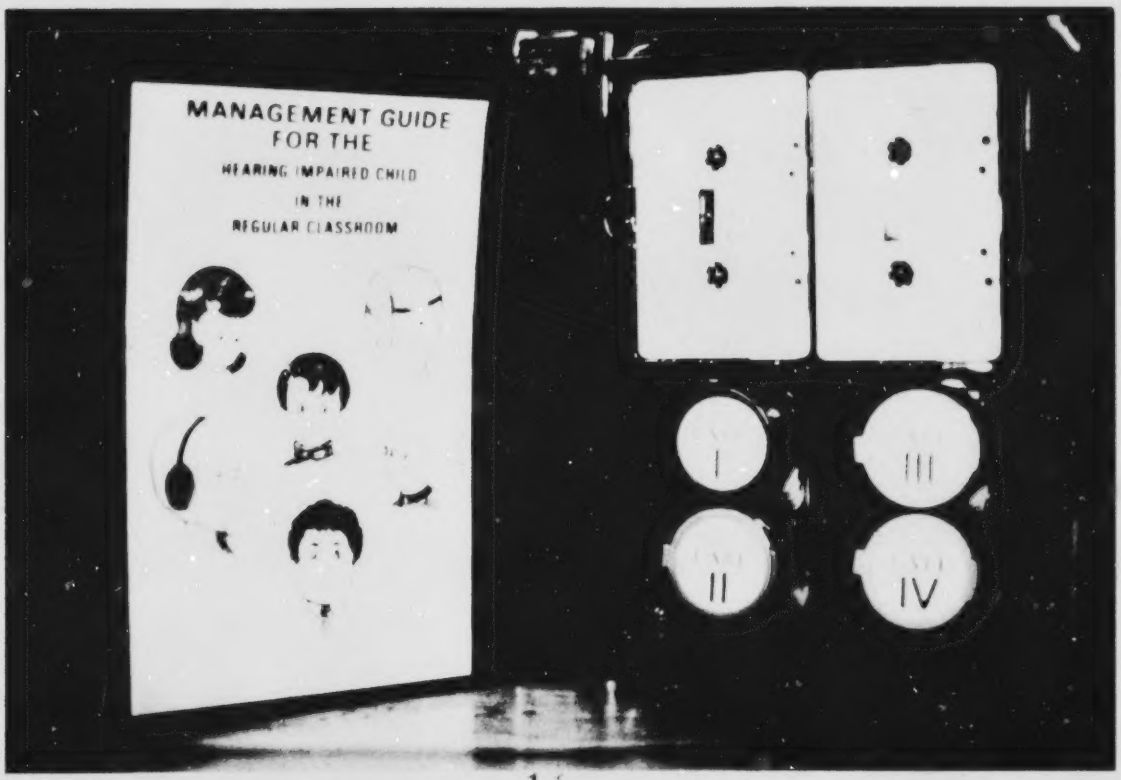
3. Objective 3: A larger number of hearing impaired students that are classified in experimental groups will show educational progress by achievement gain scores of at least six months for a ten month school year period as measured by the Metropolitan Achievement Test battery.

The treatment procedures (A-V program, FM transmitter and teacher-counselor service) were delivered to the regular classroom teachers and children by the project staff. The research design included three treatment groups and a control group. It was the intention of this design to compare the effectiveness of treatment by groups in terms of its effect on achievement. The treatment procedures were delivered in the following manner to each group.

GROUP	TREATMENT	TIME
1	(a) Teachers and parents view A-V program, "An Experience in Deafness."	2 hours
	(b) Teachers and children use FM amplifying system.	Daily
	(c) Teacher-Counselor visit.	2 hours weekly

GROUP		TREATMENT	TIME
II	(a)	Teachers and parents view A-V program, "An Experience in Deafness."	2 hours
	(b)	Teachers and children use FM amplifying system.	Daily
III	(a)	Teachers and children use FM amplifying system.	Daily
IV	(a)	No treatment control.	

The audio-visual program is a four-part filmstrip program with an audio cassette designed to provide the viewer with, "An Experience in Deafness." The primary purpose of this treatment was to provide the teacher with more information about hearing loss and let her experience the disability. Increasing her awareness may increase the "visibility" of the mild hearing loss so she could make appropriate alteration in her instruction to accommodate the children with the hearing loss.



The FM wireless amplifying system was comprised of a microphone and a receiver. The microphone was worn by the teacher. This device transmitted information to the child's receiver via an FM band up to approximately 300 yards. The child wore a receiver which he could adjust for loudness of the incoming signal. The primary reason for using this device was to maximize the use of the child's ears. Since the teacher wore the microphone close to her mouth, classroom noise and distance could not affect her speech signal to the child. These devices have been useful in classrooms for the deaf for several years. A weekly visit to assure the performance of the equipment was conducted for the three year duration of the project.

The teacher counselor service provided to children in Group I was a tutoring procedure that is commonly used for handicapped children. Two one hour visits were made to children in Group I for assistance with academic problems.

SUBJECTS:

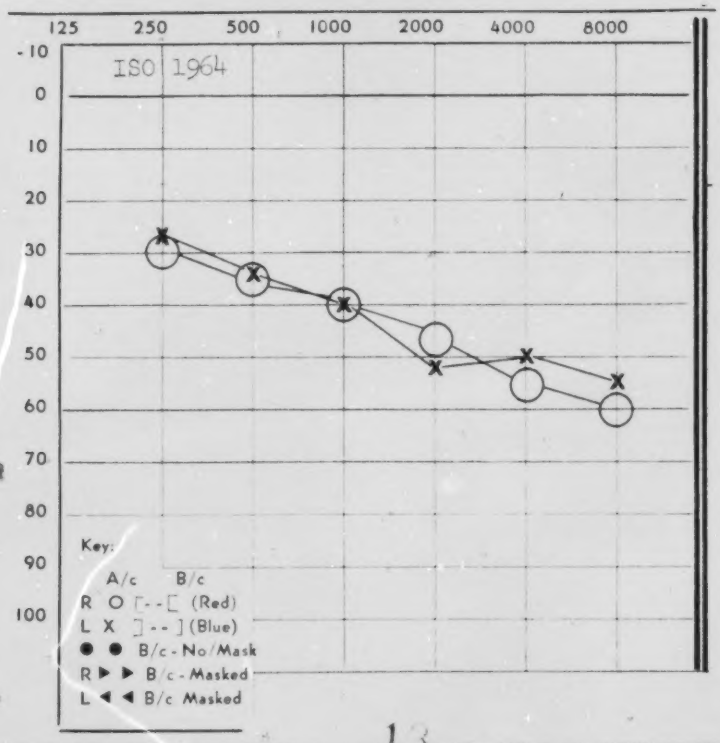
The target population was fifty-eight elementary school children with mild sensorineural hearing loss. These children were selected from county health department records, Oakland Schools' Speech and Hearing Department files, and from direct referrals. The only criterion used to select children as subjects was a sensorineural hearing loss between 25 and 60dB in the better ear. The distribution by grades of these subjects at the onset of the project can be seen in Figure 2.

Figure 2: DISTRIBUTION OF SUBJECTS BY GRADES

	K	1	2	3	4	5
N =	1	8	16	13	10	10

Their mean age was eight. Figure 3 reveals the magnitude of the mild sensorineural hearing loss present in these children.

Figure 3: MEAN THRESHOLD RESPONSES FOR 58 CHILDREN



Speech reception threshold confirmed the pure tone findings and mean scores ranged from 26 to 44dB in the better ear. (See Figure 4).

Figure 4: SPEECH RECEPTION THRESHOLDS BY GROUPS

GROUP	I	II	III	IV
Right Ear	$\bar{X}$= 44dB sd= (22)	30dB (12)	32dB (10)	38dB (18)
	(F - 2.128, NS at 1%, df = 3/53)			
Left Ear	$\bar{X}$= 36dB sd= (10)	26dB (10)	40dB (24)	36dB (14)
	(F = 1.7528, NS at 1%, df = 3/53)			
	N= 16	10	12	19

Phonetically balanced words lists (PBK lists, 1,3,4) were administered at appropriate loudness levels and found to range from 80 to 90%. These scores would indicate this sample of hearing impaired children hear speech clearly if it is loud enough. (See Figure 5).

Figure 5: MEAN SPEECH DISCRIMINATION SCORES BY GROUPS

GROUP	I	II	III	IV
Right Ear	$\bar{X}$= 80% sd= (10)	88% q (12)	88% (14)	90% (10)
	(F = 1.3500, NS at 1%, df = 3/49)			
Left Ear	$\bar{X}$= 80% sd= (10)	90% (12)	88% (16)	88% (12)
	(F = 1.6456, NS at 1%, df = 3/52)			
	N= 16	10	11	19

These children had been enrolled in regular classrooms throughout their academic careers. The classroom teachers included in the project were not specially selected in any way. The child and the teacher came together. Since each child changes teachers each year, approximately 150 teachers were involved in the three year period of the project. Children were randomly selected to participate in the various groups for treatment.

Tape recordings of conversational speech used by this sample of children was intelligible and with the exception of two children, considered to be "normal." Twenty-one of the fifty-eight children had hearing aids in one or both ears but less than half of these children wore them consistently.

TESTING PROCEDURE

A variety of testing proceudres were utilized throughout the project to measure changes in behavior and treatment. The following tests were administered:

TESTS	DATES	PURPOSE
Audiometric Examination	June-Sept.,1971	Establishes hearing level
Speech Discrimination Testing	June, 1971 in Clinic Classroom	Test listening skills
	Sept.,1972, Sept.-Mar.,1973, June, 1974	Test listening skills
Wide Range Achievement Test	July, 1971	Baseline for Achievement
Metropolitan Achievement Tests	Oct., 1971	Baseline
	June, 1972	Repeat measures
	June, 1973	Repeat measures
	June, 1974	Repeat measures
Gates-McKillop Reading Test	Oct., 1971	Reading skills
	May , 1972	Reading skills

TESTS	DATES	PURPOSE
Gates-MacGinitie	May, 1973 May, 1974	Reading skills Reading skills
Piers-Harris Self-Concept Inventory	1971 1973	Self-concept Self-concept
Peabody Picture Vocabulary Test	July, 1971 May, 1972	Vocabulary Vocabulary
Weschler Performance Scales	July, 1971	
Northwestern Syntax Screening Test	July, 1971 May, 1974	Syntax screening Syntax screening
Oral Language Sample	July, 1971 May, 1973	
Series of Questionnaires	Sept., 1971-- June, 1974	

The data resulting from the administration of these tests was analyzed to demonstrate differences in treatment as well as to illustrate the usefulness of each procedure on an individual basis.

TREATMENT PROCEDURES:

Audio-Visual Units

Four audio-visual units were developed for use with classroom teachers and parents. These units include:

1. The Anatomy of a Hearing Loss
2. What It is Like Not to Hear
3. Suggestions for Classroom Teachers and Parents
4. Hearing Aids

The primary reason for constructing these audio-visual units was the obvious need for information regarding hearing loss and delivery system for

the information so that it could be directed to classroom teachers. It was our initial goal to simply develop materials that provided information for classroom teachers; however, after showing this program to classroom teachers, it became obvious to us that what we were doing was to provide these teachers with "an experience in deafness." It appeared as we progressed through our showing of these programs that teachers were not convinced that a child with a mild sensorineural hearing loss had any trouble with communication in the classroom. Only after seeing "An Experience in Deafness" through our audio-visual program and having the teacher administer test materials in her classroom, did she begin to realize the magnitude of the problem that a child faces when he has a mild deafness. As a result of this experience with teachers our program is now directed toward a "show me" experience in all aspects of information for regular classroom teachers.

Demonstrating the "significance" of the mild hearing loss is critical to teacher cooperation. Units I and II were presented to parents and classroom teachers and a pre- and post-test score was obtained. A significant number of viewers made fewer errors on the post-test indicating they had gained knowledge regarding deafness. (See Figure 6).

Figure 6: PERCENTAGE OF SCORES IMPROVED FOR PRE-POST TESTS A-V UNITS I AND II

UNIT I	UNIT II
83%	74%
(N = 65)	(N = 47)

While the changes in number of errors was minimal for the pre-and post-tests, a sample was obtained for subjects who did not see the A-V program and were given a pre-and post-test. Figure 7 reveals no significant change in their scores.

Figure 7: COMPARISON OF PRE-AND POST-TESTS FOR TREATED AND UNTREATED GROUPS

	IMPROVED	DID NOT IMPROVE
TREATED	36	13
UNTREATED	3	7

df = 1
X^2 = 7.0035*
(*Significant 0.01)

A questionnaire was administered to teachers regarding the usefulness of information in Unit III, "Suggestions for Classroom Teachers and Parents." They reacted positively to that information citing no additional bits of information they wished to have added. In most cases the teachers thought this information was helpful and useful to them and suggested that it be shown at the very first part of the school year so that they could utilize the techniques suggested as long as possible.

The audio-visual series seems to provide the classroom teacher with a concrete experience in deafness. The use of this program followed by the administration of listening tests to the hearing impaired child and his normal hearing peers should provide each classroom teacher with first hand experience with the significance of the hearing loss. Phonetically balanced words lists for the children (Haskin's P-B Discrimination Test) were administered. (See Appendix A--Management Guide #5). These lists

were given to the entire class under three conditions: no hearing aid (no lipreading), with hearing aid (no lipreading), with lipreading and hearing aid permitted. The scores obtained from these lists are not particularly significant. It is the teacher's observation of the hearing impaired child's behavior that will be valuable. He might look at his neighbor's paper, ask the teacher to let him see her face, disturb the class, et cetera. The lists are easy enough that normal hearing children will score 100% repeatedly. If the child does not make any errors it is possible he does not have trouble hearing this teacher. This is important to know. The use of the PBK word lists administered on an individual basis by the teacher can provide the teacher with a more concrete experience with this child. The primary objective of these tests is to determine if the hearing impairment is a significant factor in the classroom. The listening tasks have been administered at eight feet in all conditions since this seems to be a mean distance in a classroom between teacher and child. Other listening tasks should be devised to accomplish the same goal. The visibility of the deafness to the child and teacher should be explored further. A further discussion of these techniques is included at the end of this section.

These four audio-visual programs provide a counseling tool for all professional persons working with hearing impaired children. They can be hand-carried from the audiologist's clinic where the hearing loss is first diagnosed to the child's classroom by parents. The importance of the hearing loss and its effect on hearing a child's teacher can then be assessed carefully. It may be that if we can establish the effect of the hearing loss on learning in the classroom through the use of this audio-visual program and its suggested listening tasks we can then convince the classroom teacher of its significance. By doing this she will make the

appropriate adjustment in the classroom so the hearing impaired child has the same opportunity to learn as his normal hearing peers. With proper amplification and a teacher who realizes his auditory limitations he will have an equal opportunity to learn in the regular classroom setting.

The full impact of the use of the audio-visual units is very difficult to measure. We have observed greater cooperation in the use of the FM unit following the showing of our audio-visual units. We would interpret this as being an affect of using this technique on the teacher. The question and discussion that arises as a result of watching the program seemed to be very useful; it provides parent and teacher an open avenue for discussion regarding the child's specific problems with learning. The audio-visual program certainly provides the audiologist with the extension of his counseling techniques since he can have the parents carry this program directly to the classroom teacher when it is not possible to direct the counseling program through a teacher-counselor or other professional person. A wide variety of requests (which we had not anticipated) have come to us to use this type of programming. For example, in schools where classes of deaf children are integrated into regular classrooms, schools have requested that we show the program to their regular classroom teachers as part of an inservice training to accept these children. Directors of special education have requested the information to show to school boards so they might better understand deafness. Teachers of fifth and sixth grade children have found the information useful in science lessons in their classrooms and have even requested that we show the entire program to the classroom so that children might better understand the child with a mild hearing loss.

A questionnaire was administered (see Appendix B) to all teachers in the project in an effort to determine whether teachers in Groups I and II were better informed because they viewed the audio-visual program than were teachers in Groups III and IV, who did not see it. After summarizing these results carefully, I would conclude teachers in Groups I and II seem to have a more realistic view of the children with a hearing loss than do teachers in Groups III and IV who have had no contact with our audio-visual program and who estimate the academic ability of these children far above what it seems to be.

It has been demonstrated by parents and professionals that regular classroom teachers who have children with hearing impairment in their rooms need some type of programming to facilitate the child's placement. This Title III project has developed such a program. There are two important results that can be achieved by showing this program. First, the teacher obtains more information regarding deafness. Second, the teacher can more objectively determine if the hearing loss is "academically" significant since she is better informed. Additionally, the A-V program can be delivered by a parent or professional to the teacher so that anytime the "academic" significance arises the teacher can be programmed to evaluate "in her own mind" the significance of this problem.

FM WIRELESS TRANSMITTERS:

Hearing speech is essential to the development of language. The evidence of this fact is obvious, since without amplification and special teaching techniques deaf children do not accumulate language structures that resembles their normal hearing peers. The child with a partial hearing loss who has grown up through his years of language development

without the availability of normal hearing demonstrates problems with language development and speech that are not as obvious as those seen with profoundly deaf children. He may accumulate vocabulary skills that are not similar to those of his normal hearing peers. His articulation may be excellent; however, his sentence structure and length may be somewhat shorter than his normal hearing counterparts. If no medical or surgical correction of the child's hearing loss is indicated he will most likely benefit from the use of an amplifier so that speech may be louder in his ear and meaningful repetition can occur throughout his daily activities. The only option of a hard of hearing child for amplification in the regular classroom until a few years ago was a wearable hearing aid, either the body or over-the-ear type. This type of amplification system is quite adequate when the environment is quiet and the child is within five or six feetof the speaker. As you might imagine this situation does not occur in classrooms where learning is to take place, since in school there may be twenty-five or twenty-six children constantly making some type of noise. Discussions with children and adults who wear hearing aids don't always verify the presence of disrupting noise, especially if their hearing loss is mild, since they frequently have no idea of their communication loss in these situations. Many hearing impaired children are such excellent lipreaders that they do not become overly concerned about the noise or the problems that it causes for them. In the last few years a significant optional program has become available for hard of hearing children but has not been used extensively in the regular classrooms. This concept involves an FM transmitter system whereby the teacher wears an FM microphone which transmits a signal to a box type receiver that can be worn by the child. This system is completely wireless

and has an operating range of approximately 100 feet. Classrooms of deaf children have been equipped with FM transmitters for several years, but very seldom does one observe this type of equipment in the regular classroom for hard of hearing children or even for deaf children who have been integrated into the regular classrooms. Since this system completely eliminates the factors of distance and noise in the classroom, it seems a feasible procedure to initiate on behalf of the hard of hearing child who is sitting five or ten feet from his classroom teacher attempting to hear her through noise that is created by other children in the room.

The original goal of this research project was to utilize inexpensive wireless transmitting equipment. At the onset of the research project there was available wireless transmitting equipment that costs approximately $900 per child. Since this equipment was so expensive an attempt was made to purchase inexpensive microphones and transmitters. Four wireless transmitting microphones (Piezo Model WX127, Piezo Model WX172, Fleetwood Model 3002, Monarch FM W007) were purchased at a cost ranging from $20-80. A suitable FM receiver (Channel Master Pocket Radio Model 6229) was obtained for approximately $12. The radio receiver was fitted with a hearing aid receiver and cord. The frequency response of this system resembled a body-aid with approximately 50 decibels of gain. It must be remembered that children included in this project had a mild deafness and the amplification required was minimal. After examining several of these wireless microphones it was determined their suitability for use in the regular classroom was questionable due to a variety of problems that occurred. The primary difficulty was maintaining an adequate signal from the microphone to the child's receiver. Constant

drifting occurred whereby the child might be listening to noise or his favorite ball game during the school day. As a result of this experience a local electronics company agreed to assemble FM microphone units so that an effort could be made to determine what it would cost to accomplish this task. For approximately $36 the microphones were built. Actually, these microphones were assembled since the transmitter portion was purchased for approximately $5 and the microphone and castings accounted for the balance of the cost of the equipment. These microphones were then tuned to FM receivers (Channel Master Pocket Radio) and an adequate signal was obtained. Magnetic recordings of speech broadcast through this inexpensive equipment compared to the very expensive amplifiers was not distinguishable. This inexpensive microphone was then placed in approximately thirty-five classrooms for use during the regular classroom day. It was hoped that an inexpensive FM wireless transmission system could be made available for regular classroom use by simply utilizing equipment that was available at most electronics shops. The most serious problem that occurred with these microphones and receivers was the frequency of battery change that was required due to teachers and children leaving power switches on. This seemed to occur most frequently during the first two or three weeks of school but did not persist throughout the school year. These microphones were utilized for two years and it was quite obvious to us at that time that they lack the stability that is required for regular classroom use. Constant drifting, broken antenna cords, fragile microphones and battery cables all contributed to numerous equipment problems throughout the school day. It was also quite obvious that classroom teachers will not use consistently a piece of amplifying equipment unless it is working adequately. This experience pointed out to us

that any type of amplifying equipment whether it be a wearable hearing aid or a $900 wireless transmitter requires constant maintenance which means a visit to that child approximately every week, preferably every day, to determine that the amplifying system is in good order. It would appear at this time that utilizing the expensive commercial equipment would be advisable. The 1971 FCC ruling on FM microphone broadcast requirements has had a tendency to prohibit the sale and development of low powered wireless microphones thereby limiting the usefulness and availability of these devices.

The first question to be answered in this treatment procedure was to determine if the wireless transmitters improved the hearing of these children. Speech discrimination scores (Haskin's PBK Word List) were obtained under classroom conditions. Hearing impaired subjects were asked to repeat mono-syllabic words (PBK List 1-3) presented to them at conversational speech level (64 dB SPL).

These lists (50 items) were presented through a tape recorder (Ampex Model 602.2) and a speaker (Ampex Amplifier Model 622) situated eight feet from the child's desk. Three conditions were tested. The child was asked to repeat the word list in an unaided condition (no hearing aid or amplifier), with his hearing aid and while wearing the wireless transmitter. The tests were conducted in a modern classroom with only the child and the teacher present. No lipreading was possible since words were presented through a tape recorder and speaker.

The test results for the condition in which no amplifier was used are summarized in Figure 8. These test results are reported by treatment

groups since our primary concern was with differences in treatment. Discrimination scores reveal statistically significant differences between groups. The primary reason for this significance is the difference between Groups I and II. The highest score obtained by Group II (74%) reflects good discrimination for this type of test since it suggests little or no problem hearing speech under quiet conditions (80% or better score on the task seldom yields a complaint from hearing impaired adults). The other three groups have low scores suggesting considerable listening problems.

Figure 8: SPEECH DISCRIMINATION SCORES WITH NO AMPLIFIER AT EIGHT FEET IN A QUIET CLASSROOM BY GROUPS

GROUP	I	II	III	IV
$\bar{X}$ =	34%	74%	52%	62%
sd =	(22)	(22)	(10)	(30)
N =	16	10	11	16

(F = 7.6146, S at 1%, df = 3/49)

The superior discrimination scores for this listening test on the part of Group II was further substantiated when groups are compared by speech reception threshold (see Figure 9). You will note again that Group II has the lower SRT in the left ear (indicates better hearing). The significance of this finding will be discussed later.

Figure 9: SPEECH RECEPTION THRESHOLDS BY GROUPS

GROUP		I	II	III	IV
Right Ear	$\bar{X}$ =	44dB	30dB	32dB	38dB
	sd =	(22)	(12)	(10)	(18)
		(F = 2.128, NS at 1%, df = 3/53)			
Left Ear	$\bar{X}$ =	36dB	26dB	40dB	36dB
	sd =	(10)	(10)	(24)	(14)
		(F = 1.7528, NS at 1%, df = 3/53)			
	N =	16	10	12	19

A second list of phonetically balanced words was presented to the children by a male speaker at eight feet while each child wore an FM receiver and the announcer wore an FM transmitting microphone. The speech level of the announcer was monitored at 64 decibels (SPL) or conversational speech. Figure 10 reveals the mean change in speech discrimination scores while wearing these amplifying units. A speech discrimination score that changes 10% or more is usually considered to be significantly different. Figure 10 reveals that mean discrimination scores did improve significantly except in Group II. Since it was the purpose of this investigation to determine the value of FM transmitters for children with mild hearing loss, children in Group II who did not receive a positive score were not discouraged from using the equipment in the classroom. Seventy-two percent of the children tested (N = 51) with this amplifying system had improved listening scores under classroom conditions that exceeded 10%. These clinical scores would suggest that the wireless FM transmitter is a device that will improve the hearing of speech for hard of hearing children in a classroom situation. Since this was a rather clinical test, further examination of the benefit of this equipment was carried on.

Figure 10: COMPARISON OF UNAIDED AND WIRELESS DISCRIMINATION SCORES FOR CLASSROOM AT EIGHT FEET

GROUP		I	II	III	IV
No Amplifier	$\bar{X}$ =	34%	74%	52%	62%
Wireless	$\bar{X}$ =	72%	82%	78%	76%
Improvement		38%	8%	26%	10%
	N =	(16)	(8)	(11)	(16)

An additional experiment was conducted on six children who had worn their own personal hearing aids throughout the first six months of the school year and an attempt was made to introduce the wireless FM system into their classrooms and look for significant change. This experiment was conducted at Vaughan School, Bloomfield Hills School District, with six children who had been integrated for seven months of the school year. They had used their own hearing aids up to the time of our intervention. We thought it would be interesting to introduce the wireless units and determine if this equipment provided any advantage to the teacher or child. These children were under the supervision of a teacher-counselor.

Two types of listening tasks were administered to the six subjects in that experiment. A 25 item hard alphabet list was presented to the entire class under the conditions as seen in Figure 11. The best score was obtained using the wireless equipment in all cases. When an individual test with only the hard of hearing child and his teacher were present the scores reflected the same positive result with the wireless condition resulting in fewer errors. Figures 13 and 14 also reflect the same affects on three subjects where the test materials and conditions were randomized.

Both sets of tests measure the effects of listening to speech in a similar manner, however, it should be noted the hearing aid and wireless scores are similar only when it is quiet. In the classroom setting (Figures 11 and 13) the scores are best for the wireless condition.

Figure 11: NUMBER OF ERRORS FOR A 25 ITEM LISTENING TEST (HARD ALPHABET) ADMINISTERED IN THE REGULAR CLASSROOM BY THE TEACHER TO THE ENTIRE CLASS

	No Hearing Aid	Hearing Aid	Wireless
Julie	*18	12	2
Ron	24	15	12
Carol	21	9	2

*Normal hearing children made 0 errors on all tests.

Figure 12: NUMBER OF ERRORS FOR A 50 ITEM LISTENING TASK (PBK WORDS) ADMINISTERED INDIVIDUALLY TO EACH CHILD AT EIGHT FEET OUT OF HIS CLASSROOM

	No Hearing Aid	Hearing Aid	Wireless
Julie	26	6	2
Ron	50	32	38
Carol	40	22	12

Figure 13: NUMBER OF ERRORS FOR A 50 ITEM LISTENING TASK (PBK WORDS) ADMINISTERED IN THE REGULAR CLASSROOM TO THE ENTIRE CLASS BY THE TEACHER

	No Hearing Aid	Hearing Aid	Wireless
Amy	9	0	3
Marty	25	6	1
Rusty	45	26	2

Normal Hearing subjects made 0 errors.

Figure 14: NUMBER OF ERRORS FOR A 25 ITEM LISTENING TASK (HARD ALPHABET TEST) ADMINISTERED IN AN INDIVIDUAL BASIS BY THE TEACHER IN A QUIET ROOM

	No Hearing Aid	Hearing Aid	Wireless
Amy	4	0	1
Marty	12	4	5
Rusty	9	3	0

Discrimination scores obtained in the clinic and classroom suggest that wireless transmitters do improve speech discrimination in the regular classroom and maintain this improvement over distance and noise where wearable hearing aids do not provide these advantages.

The second major question regarding wireless FM transmission in the regular classroom is whether the classroom teachers will use this equipment in their everyday activities. A questionnaire called a "Use Survey" was completed by each teacher. Figure 15 reveals that most of the teachers utilized the equipment approximately two to three hours per day. Figure 15 also reveals that seven teachers use the equipment only one hour a day. We interpret this to mean that these teachers did not use the equipment at all. Of the twenty-seven teachers from whom a sample was obtained it should be noted that thirteen used the equipment more than two hours per day, and seven did not apparently use it very much at all. It should be noted there was little change in the numbers of hours per day the equipment was utilized in the 1971-72 versus 1972-73 school year. It should be remembered that each child had different teachers for these two school years, however, it is important to note that poor wireless amplifier users continued not to wear the equipment in the second year. Therefore,

we would certainly question whether it has anything to do with the teacher whether they use the equipment or not, but rather with the child's loss of hearing or other problems that may develop as a result of his wearing this equipment.

Figure 15: AMPLIFIER USE IN CLASSROOM

1971-72

Number of Teachers	Number of Hours Used Per Day					
	(1)	(2)	(3)	(4)	(5)	(6)
Group I	1	2	2	3	0	1
Group II	3	3	1	0	0	1
Group III	3	0	2	3	2	1

1972-73

Number of Teachers	Number of Hours Used Per Day					
	(1)	(2)	(3)	(4)	(5)	(6)
Group I	2	4	4	1	0	1
Group II	2	1	1	1	1	1
Group III	3	1	2	0	2	0

It should also be noted that the introduction of this equipment was made in a very different way by groups. For example, Group I received bi-weekly visits by the teacher-counselor who constantly monitored and explained the use of this equipment to the classroom teachers; whereas, children in Groups II and III received an initial instruction as to the use of the equipment and were left to their own devices after that. This was

especially true in Group III where only initial contact was made and the teacher was left to her own creativeness when introducing this equipment to the other children in the classroom, explaining it to the hearing impaired child and getting him to wear it. No significance was noted in the hours per day that the children wore the equipment or the subject matter for which it was used between groups. However, from the standpoint of teacher's information, it appeared that teachers in Group III had many more questions that went unanswered throughout the school year and were quite unhappy about the lack of information given them regarding this amplifying equipment.

Classroom teachers who utilized the wireless amplifying equipment were asked to evaluate the willingness on the part of the child to wear the amplifiers. Teachers indicated that a majority of the children wore the units willingly (see Figure 15A). It should be noted that in Group III there was a greater percentage of unwilling children as compared to Group I in this regard. The persistent contact the teacher-counselor had with the teachers in Group I probably contributed to the fact there were more children willing to wear this equipment in that group. It is, on the other hand, not surprising that children in Group III seemed to have more difficulty in this area since no attempt was made to explain the use of the equipment, show these teachers the audio-visual program, or demonstrate why they needed it. The need for further information by the classroom teacher is well illustrated here.

Figure 15A: WILLINGNESS TO WEAR WIRELESS AMPLIFIER BY GROUPS

	Group I	Group II	Group III
1971-72			
Yes	11	6	7
No	3	3	4
1972-73			
Yes	11	8	5
No	3	1	4

Teachers felt that the majority of these children did benefit from the use of this equipment (see Figure 16). There was no difference between groups in this matter, however, it is quite clear to us that a number of children did not use the equipment effectively and we have attempted to determine why this has occurred.

Figure 16: TEACHER'S OPINION AS TO WHETHER THE WIRELESS UNIT IMPROVES HEARING

	Group I	Group II	Group III
1971-72			
Yes	9	7	7
No	0	0	0
Uncertain	5	2	4
1972-73			
Yes	12	5	5
No	0	0	1
Uncertain	3	3	3

Teacher opinion and objective measurement of improvement in understanding speech while wearing FM wireless amplifying units was the main basis of determining the usefulness of this equipment throughout this study. After three years of encouraging approximately forty elementary school children and their teachers to use this equipment, we found that fourteen of these subjects or 35% seemed to benefit significantly on a daily basis in the classroom. It should be recalled that no attempt was made to select subjects at the onset of the project as to their suitability for such a device. They were fitted indiscriminately to determine on a "use" basis, whether or not this device was of any value to them in the classroom.

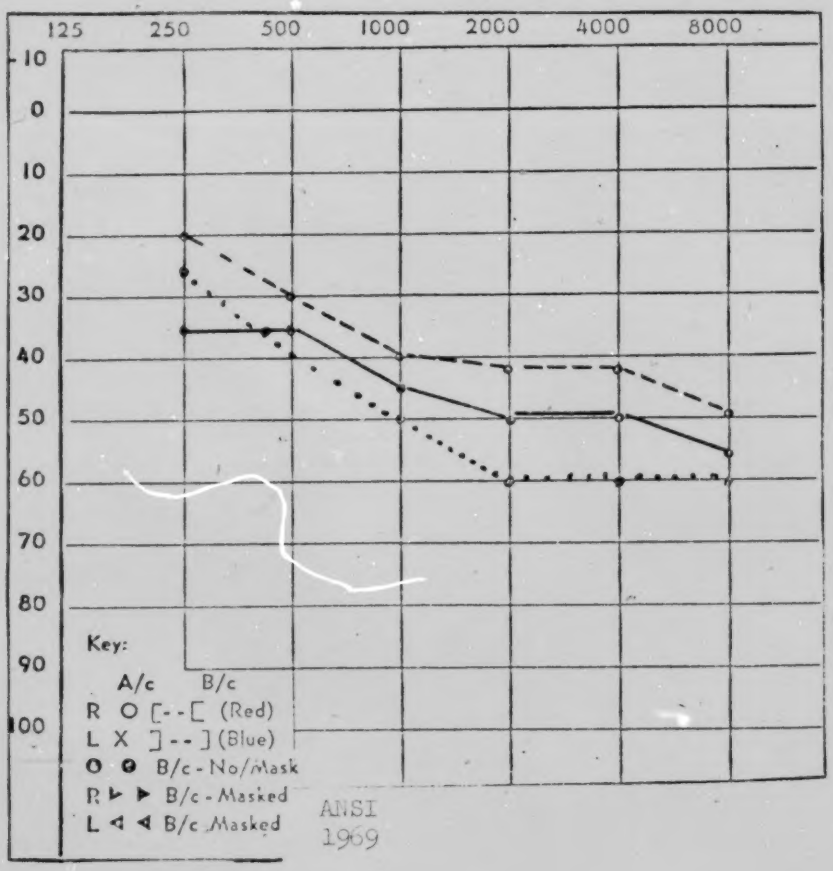
A comparison of good users and poor users was made to determine those characteristics which seem to identify a potential candidate for this type of amplification.

Subjects were classified as good users and poor users utilizing the following criteria. Teacher opinion, (benefit to the child, benefit to the teacher, ease of use, et cetera) actual time unit was worn each day, subject for which the unit was used, listening test scores (PBK Word words) administered with and without the amplifier in the classroom and clinical test scores obtained under the same conditions were obtained and documented to establish whether a child was considered a good user or a poor user. Good users wore the amplifying units on a daily basis and teachers noted (in each case, three different teachers) improvement in the hearing in the classroom. It was interesting to note that whenever a good user had a mechanical problem with his unit the classroom teacher

would immediately contact the project staff for repairs. Teachers of children who were poor users seldom bothered to call.

Subjects were divided into three groups: good users, poor users and inconsistent users. A comparison of audiometric data reveals that pure tone thresholds were considerably different for each group as illustrated in Figure 17.

Figure 17: COMPARISON OF MEAN PURE TONE THRESHOLDS FOR GOOD, POOR AND INCONSISTENT USERS OF FM WIRELESS EQUIPMENT IN REGULAR CLASSROOMS



Poor wireless users had mean pure tone thresholds that were 5 to 15dB better than the good or inconsistent users. This was further confirmed by the comparison of speech reception thresholds seen in Figure 18.

Figure 18: COMPARISON OF SPEECH RECEPTION THRESHOLDS FOR GOOD, POOR AND INCONSISTENT USERS OF FM WIRELESS EQUIPMENT IN REGULAR CLASSROOMS

	Good Users	Poor Users	Inconsistent Users
Right Ear $\bar{X}$ =	44dB	32dB	44dB
Left Ear $\bar{X}$ =	36dB	26dB	42dB

It is obvious that poor users had audiometric thresholds that suggest their hearing loss is a minimal problem for them. The "low" visibility of their hearing loss, which is not changed markedly by the amplifier, no doubt convinces both the child and teacher this device is not required. The time and energy required to use this instrument is not balanced by the improvement it gives. Good and inconsistent users seem to have similar degrees of hearing loss. In fact, the mean pure tone thresholds of the inconsistent users was worse than good good users; yet the subjects were not considered successful. Other factors such as uninterested teachers, behavior problems, parent attitude, et cetera contributed to children being considered poor users even though the need to have improved hearing seems to exist.

Speech discrimination scores (PBK list 1,3,4) obtained under earphones indicate no significant differences between groups as seen in Figure 19.

Figure 19: COMPARISON OF MAXIMUM SPEECH DISCRIMINATION SCORES (PBK) OBTAINED UNDER EARPHONES FOR GOOD, POOR AND INCONSISTENT USERS OF FM WIRELESS EQUIPMENT IN REGULAR CLASSROOMS

	Good Users	Poor Users	Inconsistent Users
Right Ear $\bar{X}$ =	82%	90%	80%
Left Ear $\bar{X}$ =	84%	90%	82%

The vital factor in the use of this device in the classroom was the "visibility" of the hearing loss. Certainly, the magnitude of the deafness determines this factor. The higher the "visibility" the greater the chance this device will help the child whether he uses a personal hearing aid or not.

Speech discrimination tests were administered by the child's regular classroom teacher to obtain objective information as to the benefit of these amplifying units.

Figure 20 reveals that mean gain scores were considerably higher (+30%) for good users when no amplifier and the wireless unit were compared.

Figure 20: COMPARISON OF SPEECH DISCRIMINATION SCORES OBTAINED UNDER CLASSROOM CONDITIONS AT EIGHT FEET FOR GOOD, POOR AND INCONSISTENT USERS OF FM WIRELESS EQUIPMENT IN REGULAR CLASSROOMS

	Good Users	Poor Users	Inconsistent Users
No Amplifier $\bar{X}$ =	46%	62%	24%
FM Wireless Amplifier $\bar{X}$ =	76%	70%	76%
Difference	+30%	+ 8%	+52%
	N =12	N=13	N= 7

Poor users made only an 8% gain when tested under similar conditions. This score again suggests that using this unit under carefully controlled conditions does not improve the hearing of speech significantly to make either the teacher or child aware of any benefits. The inconsistent users demonstrated the greatest gain in speech discrimination suggesting that factors other than hearing loss play a significant role in the successful use of this equipment. It was our impression that teacher reluctance played a major role in lack of use with these children.

A comparison of sex, age, group placement and grade place reveal no significant differences between these groups (see Figure 21).

Figure 21: COMPARISON OF GRADE, AGE, SEX AND GROUP PLACEMENT FOR THREE GROUPS OF FM WIRELESS USERS

	Good Users	Poor Users	Inconsistent Users
Age	$\bar{X}$ = 134 Mos.	$\bar{X}$ = 136	X = 133
Sex	No.of Males = 4	Males = 8	Males = 6
	No.of Females = 8	Females = 5	Females = 1
Group Place	(I)6(II)4(III)2	(1)5(II)5(III)3	(I)5(II)0(III)2
Grade Placement	2nd = 1	= 0	= 0
	3rd = 1	= 1	= 2
	4th = 3	= 3	= 1
	5th = 2	= 5	= 2
	6th = 3	= 2	= 1
	7th = 2	= 2	= 1

Only a small number of subjects wore their hearing aid consistently enough to compare listening scores for both hearing aid and FM wireless conditions. Figure 22 reveals that mean FM wireless scores were higher than hearing aid scores for both good users and inconsistent users; whereas, poor users again illustrated no difference. The magnitude of difference between these scores is very small (8-12%). Since a variety of acoustic conditions exist in a regular classroom throughout each school day, it is probably possible to demonstrate the benefits of each system at some time without difficulty. It is interesting to note, however, that FM wireless transmission is not likely to vary under any classroom condition.

Figure 22: COMPARISON OF SPEECH DISCRIMINATION SCORES OBTAINED WITH HEARING AIDS AND FM WIRELESS AMPLIFIERS UNDER REGULAR CLASSROOM CONDITIONS (EIGHT FEET)

	Good Users	Poor Users	Inconsistent Users
FM Wireless $\bar{X}$ =	78%	76%	74%
Hearing Aid $\bar{X}$ =	N = 6	N = 2	N = 7
Hearing Aid $\bar{X}$ =	70%	78%	62%
	N = 6	N = 2	N = 6

The primary reason for fitting hearing aids and using wireless FM amplifying system was to improve the subject's hearing and consequently his communication with other human beings which hopefully will result in "normal" language and speech development and provide him an equal opportunity to learn through his ears. A comparison of the academic achievement gains of best users of FM equipment and poor users of this equipment is summarized in Figure 23.

Figure 23: SUMMARY OF ACHIEVEMENT GAINS FOR BEST USERS AND POOREST USERS OF FM WIRELESS EQUIPMENT WHO HAD SIMILAR GRADE LEVEL ACHIEVEMENT SCORES IN 1971

TOTAL READING -- 70% of Best Users Score Higher

TOTAL MATH -- 61% of Best Users Score Higher

(N = 9)

Children who had similar grade level achievement in reading and math in 1971 (Metropolitan Achievement Test) were compared as to the achievement gains they made after three years of school. It is interesting to note that even though the number of comparisons made were small (Figure 23), the consistency (70%) of the good users over poor users in making better academic progress was higher. This was also found in the math scores. If good users learn through their ears better than poor users, then this relationship should be even stronger when good users were compared with non-users. Figure 24 reveals this to be true since 78% of the best users score higher when this comparison was made in total reading.

Figure 24: SUMMARY OF ACHIEVEMENT GAINS FOR BEST USERS AND NON-USERS OF FM WIRELESS EQUIPMENT WHO HAD SIMILAR GRADE LEVEL ACHIEVEMENT SCORES IN 1971

TOTAL READING -- 78% of Best Users Score Higher

TOTAL MATH -- 33% of Best Users Score Higher

(N = 6)

However, this was not true in math and the number of comparisons was small. There is a tendency here which would suggest improved hearing may

produce better learning. Admittedly, there are many other factors involved but it is clear that utilizing a wireless transmitter in a regular classroom is an excellent alternative to improve hearing. The key factor, however, would appear to be the professional's ability to select likely candidates for this device. It is our impression that several factors will demonstrate this need. First, the subject should have a permanent sensorineural hearing loss of at least 30dB. He may or may not have a hearing aid. His ability to hear conversational speech (PBK list 1,3,4) at eight feet in a classroom using a female speaker should be 70% or less. The amplifying unit (if one is available to use) should improve this score at least 20%. The child's teacher should be willing to try this equipment on a regular basis for at least one month. The most critical factor is the availablility of someone to make weekly visits to determine if the equipment is working properly. Not all of these conditions need to be met but it is important that consideration be given to each suggestion before committing someone to the purchase of this equipment. The test materials and procedure for selecting, obtaining and instructing school personnel in the use of this equipment is found in Appendix A (Guides 2-3-4-5). Every child has the "right" to hear in the best way we can provide for him. Even though this equipment is somewhat cumbersome it has been our experience that providing a clear speech signal from the teacher to the child consistently outweighs this disadvantage.

ACADEMIC ACHIEVEMENT:

A primary goal of this research project was to monitor the academic achievement of the hard of hearing children included in this sample. The purpose to this activity was to determine the magnitude of academic failure within the sample and hopefully to learn from these studies how to effectively select the potential academic failures so that appropriate academic alterations could be made as early as possible in the child's school program.

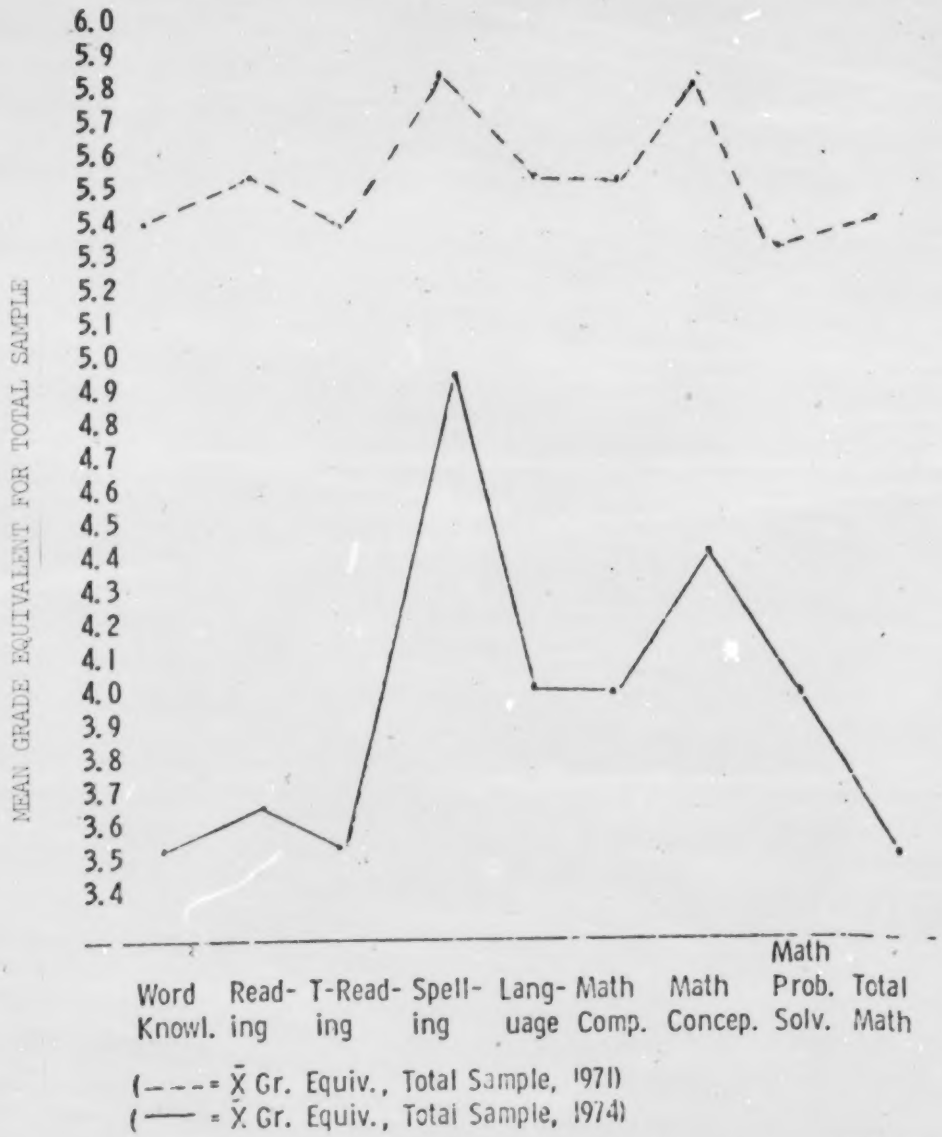
The Metropolitan Achievement test was administered in October, 1971, June of 1972, 1973 and 1974. Test forms for appropriate grade levels and directions were administered as described in the test manual.

It should be pointed out the Metropolitan Achievement test batteries are designed so that one month of achievement is expected for each month of school (ten month school year). Since it is not always feasible to interpret grade equivalents with confidence, achievement as measured by these test results were viewed in terms of the amount of gain achieved by each child.

The baseline data for the entire sample was obtained in 1971. Mean grade equivalent scores across subtests for the entire sample reveal the highest achievement in spelling and the poorest achievement in word knowledge and reading (see Figure 25).

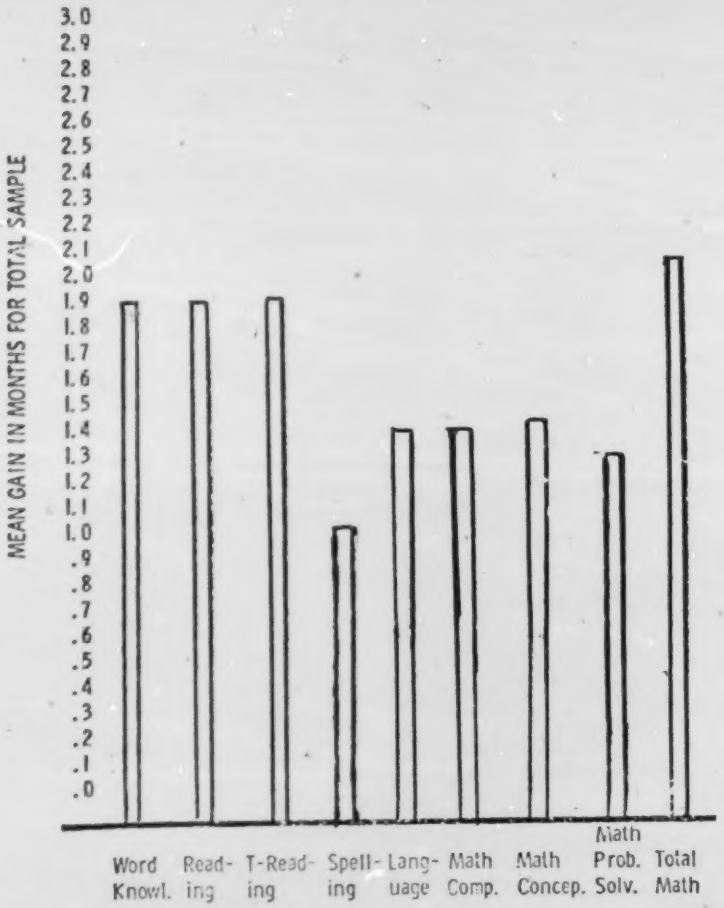
The achievement levels reflected the greatest depression in areas where hearing loss would theoretically have its greatest effect. In fact, mean math achievement was almost one full year greater on one subtest.

Figure 25: COMPARISON OF MEAN METROPOLITAN SUBTEST SCORES FOR THE TOTAL PROJECT SAMPLE (1971 AND 1974)



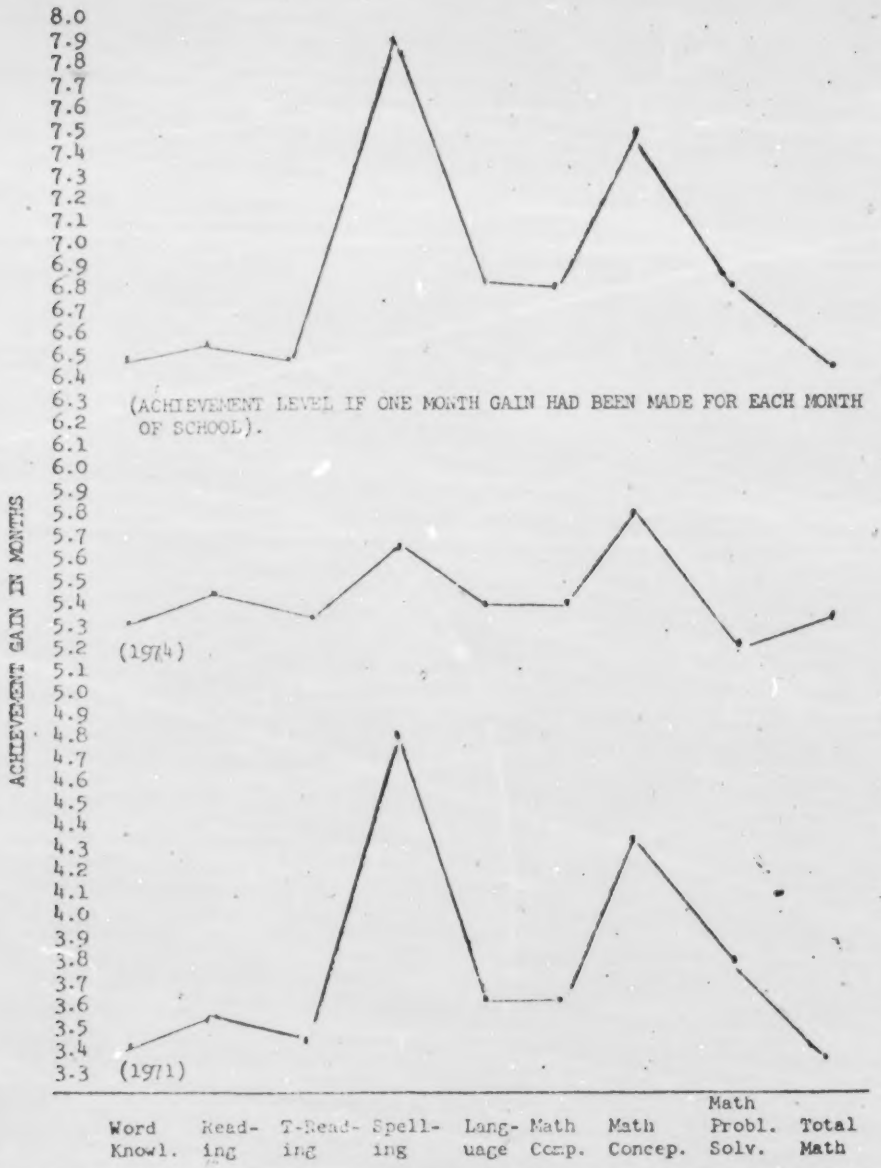
However, if consideration is given to achievement gain an entirely different impression is given (see figure 26). It can be seen that achievement after four years has been greatest in the language areas of reading and word knowledge and less dramatic in spelling. Figure 26 summarizes this growth for the entire sample. 43

Figure 26: ACHIEVEMENT GAINS FOR METROPOLITAN SUBTESTS FOR TOTAL SAMPLE



Our experience would suggest some validity to the use of "academic gain" as an index of change while using the Metropolitan Achievement test. A comparison of teacher grades and opinion versus achievement gains as measured by this test were made and both measures affected the same results for a larger number of children. Figure 27 reveals that the achievement status of the total sample is fairly equal across subtests as seen by the 1974 mean subtest scores.

Figure 27: COMPARISON OF MEAN METROPOLITAN SUBTEST SCORES FOR THE TOTAL PROJECT SAMPLE (1971 AND 1974)



The achievement level which would have been reached if each child had progressed as designed by the test and had no educational problems, can be seen in Figure 27. Since the achievement gain after three years of school did not approach this theoretical line, there obviously exists some children who are not achieving at the expected level as measured by the Metropolitan Achievement test. Approximately 34% of the project students over this three year period of time were found to be poor achievers. In an effort to determine whether hearing impairment alone or a combination of factors contributed to this result, a comparison of best and poorest achievers was made. The poor achievers were those children who made six months or less achievement gain on the Metropolitan each academic year and were 1.6 years or more below grade level in overall achievement. This gain interval and grade level equivalent was calculated by obtaining a simple mean gain score and grade equivalent across subtests for each child. (See Figure 28 for an example).

Figure 28: MEAN ACHIEVEMENT GAIN AND GRADE EQUIVALENT ACROSS SUBTESTS FOR THE METROPOLITAN ACHIEVEMENT TEST

	Word Knowledge	Reading	Total Reading
1971-72 Gain	.5	.2	.3 ($\bar{X}$ =.3)

It is interesting to note that during the three years of data collection, no child changed his position. He remained in the group as a good achiever or poor achiever. Approximately eighteen children out of fifty-three, or 34% of the hearing impaired children included in this sample, met the criterion for a poor achiever. A complete analysis of the differences between good and poor achievers was made to further identify significant differences between these groups.

Comparisons for each subtest were made for each year of data collection. Figure 29 reveals that statistically significant differences in Word Knowledge existed between these groups for the entire three years of the study. However, more important is the achievement gain made over this three year period. The good achievers obtained a growth of 2.6 years gain, while the poor achievers made only .8 of one academic year progress in their Word Knowledge.

Figure 29: COMPARISON OF METROPOLITAN ACHIEVEMENT SUBTEST SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: WORD KNOWLEDGE

Word Knowledge	Good Achievers		Poor Achievers
1971	$\bar{X}$ = 3.7 (Grade Equiv.) sd = (1.76) n = 35	(t = 1.583)*	$\bar{X}$ = 2.9 sd = (1.09) n = 14
1972	$\bar{X}$ = 4.3 sd = (2.10) n = 39	(t = 2.466)*	$\bar{X}$ = 3.0 sd = (1.31) n = 18
1973	$\bar{X}$ = 5.0 sd = (2.09) n = 31	(t = 3.426)*	$\bar{X}$ = 3.2 sd = (1.08) n = 18
1974	$\bar{X}$ = 6.3 sd = (2.13) n = 30	(t = 4.517)*	$\bar{X}$ = 3.7 sd = (1.36) n = 17

*Sig. at .01

There are two important implications from this finding. First, the Metropolitan Achievement subtest called Word Knowledge was sensitive enough to illustrate this deficiency at the beginning of the project. Second, apparently this is a skill that develops very slowly within this group of

children since the changes are so very small after three years. If this slow pattern of development in Word Knowledge persists, it is no wonder later elementary and junior high academic activities become so difficult for these children.

Scores from the Reading subtests (Figure 30) reveal somewhat the same findings. Mean achievement gains were only .7 of a year for the poor achievers and 2.6 for the good achievers over the three year period. The differences were apparent at the onset of this project and were evident at each test interval. It should be recalled that poor achievers were one-and-one-half years below grade level and made less than five months' progress each school year. To calculate the status of a given child, pre- and post-testing is necessary annually.

Figure 30: COMPARISON OF METROPOLITAN ACHIEVEMENT SUBTEST SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: READING

Reading	Good Achievers		Poor Achievers
1971	$\bar{X}$ = 3.9 (Grade Equiv.) sd = (1.93) n = 35	(t = 1.745)**	$\bar{X}$ = 2.9 sd = (1.35) n = 14
1972	$\bar{X}$ = 4.4 sd = (2.16) n = 39	(t = 2.439)*	$\bar{X}$ = 3.0 sd = (1.46) n = 18
1973	$\bar{X}$ = 5.3 sd = (2.13) n = 31	(t = 3.224)*	$\bar{X}$ = 3.4 sd = (1.53) n = 18
1974	$\bar{X}$ = 6.5 sd = (1.89) n = 30	(t = 5.365)*	$\bar{X}$ = 3.6 sd = (1.63) n = 17

* Sig. at .01
**Sig. at .05

It is interesting to note that similar, if not identical, results were obtained in 1973 and 1974 using a different reading test (Gates-MacGinitie). The mean gain and grade equivalent scores are within months of those obtained on the Metropolitan test and reveal little growth for the poor achievers (see Figure 31).

Figure 31: COMPARISON OF GATES-MAC GINITIE READING SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

	Good Achievers	Poor Achievers
Vocabulary 1973	$\bar{X}$ = 5.2 (Grade Equiv.) sd = (1.65) n = 34 (t = 3.640)*	$\bar{X}$ = 3.5 sd = (1.38) n = 18
Vocabulary 1974	$\bar{X}$ = 6.3 sd = (2.74) n = 30 (t = 3.946)*	$\bar{X}$ = 3.4 sd = (1.48) n = 17
Comprehension 1973	$\bar{X}$ = 5.2 sd = (2.64) n = 34 (t = 3.218)*	$\bar{X}$ = 3.3 sd = (1.52) n = 18
Comprehension 1974	$\bar{X}$ = 6.3 sd = (2.74) n = 30 (t = 3.946)*	$\bar{X}$ = 3.4 sd = (1.48) n = 17

*Sig. at .01

Because of the age of the subjects, the Gates-McKillop Reading test was chosen as an appropriate instrument during the first two years of the project.

An analysis of the pre- and post-test scores reveal the following:

(a) Subtests with no significant difference between good and poor achievers:

Recognizing Vowels
Auditory Blending
Syllabication
Auditory Discrimination
Recognizing and Blending
Letter Sounds
Capital Letters
Recognizing Letters (Lower Case)
Recognizing Nonsense Words
Recognizing Initial Letters
Recognizing Final Sounds

(b) Subtests with significant differences between good and poor achievers:

Spelling
Oral Reading
Flash Words
Words Untimed
Phrases

The subtests included under the first category represent what might be classified as "mechanical" reading skills that are acquired through repetitive static learning experiences. Exceptions to this would be the categories of auditory blending, syllabication, auditory discrimination, and recognizing nonsense words. These skills, listed under heading (a) above, were found to be adequate for the child's reading level for both good and poor achievers in 1971 and 1972. The second set of subtests illustrated significant differences between good and poor achievers.

These activities require application of reading skills on the part of the child. It is obvious that tests that measure this type of activity are more likely to differentiate good and poor achievers at early elementary levels. Measurement of static type skills that require "rote" learning may lead one to an erroneous conclusion about a child's potential or progress.

The spelling skills of these children were sampled at three different time periods. The results are summarized for these tests in Figure 32.

Figure 32: SUMMARY OF SPELLING ACHIEVEMENT TESTS

Test		Significant Difference	Type of Activity
Wide Range Achievement Test* 1971		No	Oral Presentation Written Response
Gates-McKillop** 1972 and 1973		No	Oral Presentation Oral Response
(Significant statistical difference but gain was same between good and poor achievers)			
Metropolitan Achievement Subtest***	1971	No	Oral Presentation Written Response
	1972	No	Oral Presentation Written Response
	1973	Yes	Choose Incorrect Word Written Response
	1974	Yes	Choose Incorrect Word Written Response

* See Appendix D
** See Appendix C
***See Appendix E

It would appear that no significant differences between groups were apparent until 1973 and 1974. The measurement of this skill would be a poor prognosticator for academic success if sampled in the early elementary grades. In fact, the pre-test grade level achievement of the entire sample was higher than any other subtest in 1971.

The language subtests for the Metropolitan are summarized in Figure 33.

Figure 33: COMPARISON OF METROPOLITAN ACHIEVEMENT SUBTEST SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: LANGUAGE

Language	Good Achievers	Poor Achievers
1971	$\bar{X}$ = 5.5 (Grade Equiv.) sd = (1.63) n = 12 (t = 2.185)**	$\bar{X}$ = 4.1 sd = (1.03) n = 8
1972	$\bar{X}$ = 5.1 sd = (2.33) n = 23 (t = 1.159)	$\bar{X}$ = 4.1 sd = (1.19) n = 9
1973	$\bar{X}$ = 5.5 sd = (2.36) n = 28 (t = 2.355)**	$\bar{X}$ = 3.9 sd = (1.68) n = 14
1974	$\bar{X}$ = 6.8 sd = (2.51) n = 29 (t = 4.229)*	$\bar{X}$ = 4.0 sd = (1.73) n = 17

* Sig. at .01
**Sig. at .05

The language subtest in the Metropolitan is designed to measure skills concerned with punctuation, capitalization, usage, dictionary skills and study skills (elementary and intermediate forms). These subtests appeared

to be among the most difficult in the entire battery. It is interesting to note that after three years of school the poor achiever had a mean grade level achievement score .1 less than when the test was first administered. Due to the fact that this type of information does not occuply a significant part of most curriculums in the early elementary grades, it is not likely that administering tests in this area would be useful to prognosticate for children.

In retrospect, the most successful instrument used to differentiate good achievers from poor achievers at the earliest possible time was the discrepancy between skills as illustrated by the Gates-McKillop. Those activities requiring the application of skills provided the greatest difference. This behavior may occur due to the lack of vocabulary and word knowledge that is present, or their behavior may be affected by their lack of response to compromising situations as illustrated by the psychological evaluation. A deficiency in the area of language skills is traditionally the area that is expected when a hearing loss is present since these skills are learned by hearing.

The mathematical skills of these children were evaluated using the Wide Range Achievement test and the Metropolitan Achievement tests. A comparison of good and poor achievers revealed no significant difference in mean achievement levels in 1971 (see Appendix D). The Wide Range tests a variety of mathematical tasks from computation to problem solving. The Metropolitan Achievement results are summarized in Figures 34, 35 and 36. Figure 34 reveals the summary data for math computation for good and poor achievers. The basic tasks of addition, subtraction, division and multiplication are measured on this subtest.

Figure 34: COMPARISON OF METROPOLITAN ACHIEVEMENT SUBTEST SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: MATH COMPUTATION

Math Computation	Good Achievers	Poor Achievers
1971	$\bar{X}$ = 4.0 (Grade Equiv.) sd = (1.46) n = 24 (t = 0.336)	$\bar{X}$ = 4.2 sd = (1.11) n = 9
1972	$\bar{X}$ = 4.4 sd = (1.73) n = 35 (t = 1.007)	$\bar{X}$ = 3.9 sd = (1.66) n = 14
1973	$\bar{X}$ = 5.2 sd = (2.16) n = 31 (t = 2.789)*	$\bar{X}$ = 3.4 sd = (2.13) n = 18
1974	$\bar{X}$ = 6.5 sd = (2.20) n = 30 (t = 4.336)*	$\bar{X}$ = 3.8 sd = (1.67) n = 17

*Sig. at .01

It should be noted that poor achievers actually lost .2 of an academic year after three years of school and good achievers made the expected progress (2.5 years' gain). Since this test simply presents computational problems each year, it is an excellent measure of progress. It should also be noted that in 1971 and 1972 there were no significant differences between good and poor achievers, and, in fact, the interval of progress was small for both groups. Math Concepts (Figure 35) reveals the same type of information. This subtest samples the child's knowledge of fractions, proportions, ratios, et cetera.

Figure 35: COMPARISON OF METROPOLITAN ACHIEVEMENT SUBTEST SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: MATH CONCEPTS

Math Concepts	Good Achievers	Poor Achievers
1971	$\bar{X}$ = 4.6 (Grade Equiv.) sd = (2.17) n = 24 (t = .919)	$\bar{X}$ = 3.9 sd = (1.21) n = 9
1972	$\bar{X}$ = 4.5 sd = (2.50) n = 37 (t = 1.140)	$\bar{X}$ = 3.6 sd = (2.07) n = 15
1973	$\bar{X}$ = 5.5 sd = (2.53) n = 31 (t = 2.892)*	$\bar{X}$ = 3.4 sd = (2.20) n = 18
1974	$\bar{X}$ = 6.8 sd = (2.36) n = 30 (t = 4.423)*	$\bar{X}$ = 4.0 sd = (1.81) n = 17

*Sig. at .01

The Math Problem Solving subtest of the Metropolitan presents a written arithmetic problem and the child must determine if he is to add, subtract, multiply or divide to find the correct solution. Figure 36 reveals that intervals of progress are small for poor achievers and acceptable for good achievers.

FIGURE 36: COMPARISON OF METROPOLITAN ACHIEVEMENT SUBTEST SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: MATH PROBLEM SOLVING

Math Problem Solving	Good Achievers	Poor Achievers
1971	$\bar{X}$ = 4.1 (Grade Equiv.) sd = (1.65) n = 24 (t = .572)	$\bar{X}$ = 3.7 sd = (1.18) n = 8
1972	$\bar{X}$ = 4.0 sd = (2.04) n = 35 (t = 1.047)	$\bar{X}$ = 3.4 sd = (1.44) n = 14
1973	$\bar{X}$ = 4.9 sd = (2.15) n = 31 (t = 3.040)*	$\bar{X}$ = 3.1 sd = (1.83) n = 18
1974	$\bar{X}$ = 6.2 sd = (2.33) n = 30 (t = 3.620)*	$\bar{X}$ = 3.8 sd = (1.86) n = 17

*Sig. at .01

The three math subtests indicate the differences that exist in 1974 were not detectable in 1971. The similarity in the gain interval across subtests for both groups also raises a serious question as to the advisability of using these tests as measures of progress.

These results suggest several important factors. First, the index of achievement gain using a test-retest procedure will be helpful in determining if children are making adequate progress in school. Using a criterion of six months or less and a grade equivalent of one-and-a-half years below grade level seems valid to predict that a poor achiever is developing. It appears this pattern of growth can be measured with this test. Second, the scores of Word Knowledge, Reading and Language reveal

differences earlier than the math skills. This may be due to a shortcoming of the test or real differences in performance.

The scores produced by the achievement test presumably reflect the child's actual performance. A survey of the CA-60 files of several children was made to determine if teachers reached the same conclusion that achievement test provided (see Figure 37).

Figure 37: COMPARISON OF TEACHER GRADES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

Teacher Grades	Good Achievers	Poor Achievers
1973 Math	$\bar{X}$ = 3.0 (C) n = 28	$\bar{X}$ = 3.0 (C) n = 12
1973 Reading	$\bar{X}$ = 2.0 (B) n = 28	$\bar{X}$ = 3.0 (C) n = 12
1973 Spelling	$\bar{X}$ = 2.0 (B) n = 28	$\bar{X}$ = 3.0 (C) n = 11

Figure 37 reveals that in 1973 good achievers received mean grades one entire point higher (B) than poor achievers except in math where even the achievement test differences were small. This finding would suggest that both measures are sampling the same learning skills.

A major question arises as to whether children with mild hearing loss who are poor achievers arrive at school with a smaller vocabulary and less depth to their language skills; or do they arrive with the same skills as normal hearing children and hearing impaired children who are good achievers but cannot use these skills adequately when transfer of training, and consequently learning, must occur.

The achievement tests revealed that 34% of the children in this study were poor achievers. It would be desirable to identify a cluster of deficiencies which might exist within the poor achievers to better identify them earlier. A comparison of data from language studies, hearing loss, intelligence tests, et cetera, will compare good and poor achievers to determine if a "loser's syndrome" can be established.

Audiometric tests reveal that mean pure tone thresholds, speech reception thresholds and speech discrimination scoresunder earphones are not significantly different when comparing the best and poorest achievers (see Figures 38 and 39).

Figure 38: MEAN PURE TONE THRESHOLDS FOR GOOD ACADEMIC ACHIEVERS AND POOR ACADEMIC ACHIEVERS

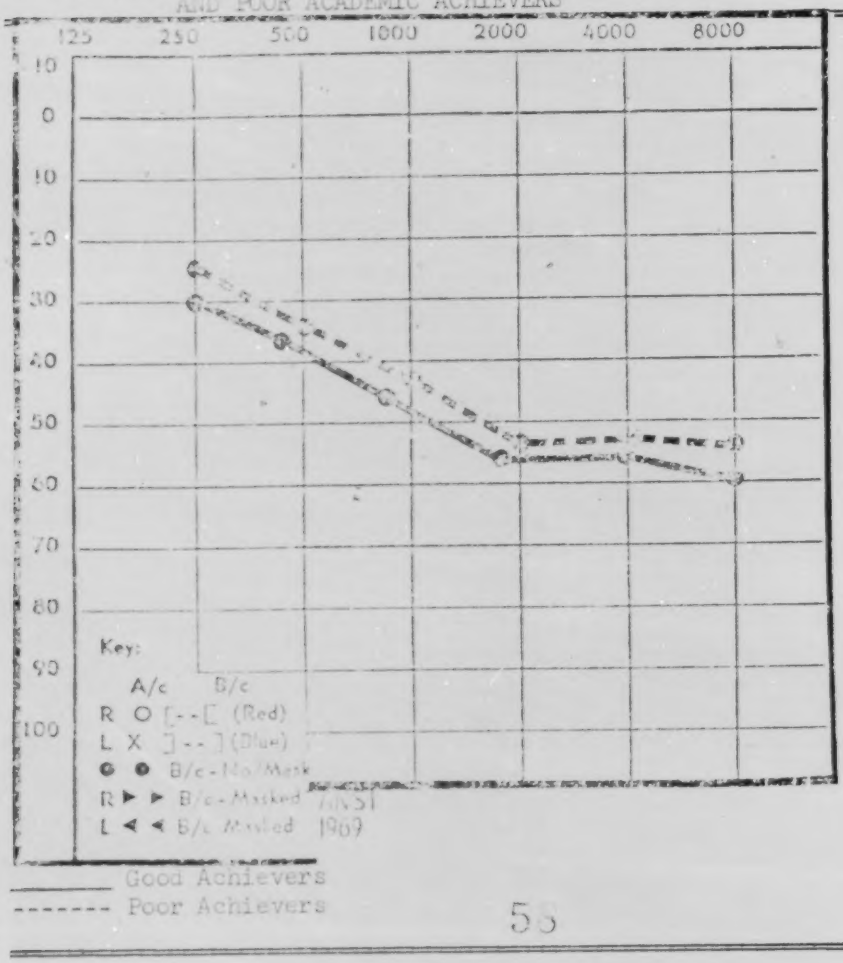


Figure 39: MEAN SPEECH RECEPTION THRESHOLDS AND DISCRIMINATION SCORES FOR GOOD ACHIEVERS AND POOR ACHIEVERS

		Good Achievers	Poor Achievers
Speech Reception Threshold	(RE)	$\bar{X}$ = 40dB sd = (20dB) n = 39	$\bar{X}$ = 32dB sd = (12dB) n = 18
	(LE)	$\bar{X}$ = 36dB sd = (18dB) n = 39	$\bar{X}$ = 32dB sd = (12dB) n = 18
Speech Discrimination	(RE)	$\bar{X}$ = 78% sd = (29.2%) n = 39	$\bar{X}$ = 86% sd = (12.1%) n = 18
	(LE)	$\bar{X}$ = 84% sd = (18.7%) n = 39	$\bar{X}$ = 86% sd = (12.1%) n = 18

It would appear that both good and poor achievers had grossly the same auditory stimulation with meaningful repetition in their preschool environment. However, due to other factors of their environment and personality, learning at school has not progressed the same.

The magnitude of hearing impairment was compared to determine if children with greater hearing loss made the same academic achievement gains as children with mild hearing loss (see Figure 40).

Achievement gains are not significantly different when children are divided into hearing loss categories. Therefore, it might be concluded that within the range of hearing loss from 25 to 60dB there is no significant relationship between magnitude of deafness and success in school.

Figure 40: GAIN IN ACHIEVEMENT SCORES (GRADE EQUIVALENT) FOR ONE ACADEMIC YEAR COMPARED WITH SPEECH RECEPTION THRESHOLDS OF THE BETTER EAR

		(1) 29dB	(2) 30-39dB	(3) 40-49dB	(4) 50dB
Word Knowledge	$\bar{X}$ =	.6	1.0	1.0	.6
	sd =	(.58)	(1.04)	(.96)	(.42)
	n =	17	15	10	6
	(F = .9641, NS at 1%, df = 3/44)				
Reading	$\bar{X}$ =	.6	1.0	.7	.7
	sd =	(.81)	(.81)	(.86)	(.64)
	n =	17	15	10	6
	(F = .7062, NS at 1%, df = 3/44)				
Total Reading	$\bar{X}$ =	.7	1.0	.8	.6
	sd =	(.70)	(1.0)	(.68)	(23.)
	n =	17	15	10	6
	(F = .4721, NS at 1%, df = 3/44)				
Language	$\bar{X}$ =	.1	1.0	2.2	.4
	sd =	(1.03)	(1.40)	(1.57)	(.57)
	n =	8	7	3	2
	(F = 2.2548, NS at 1%, df = 3/16)				
Spelling	$\bar{X}$ =	.6	1.0	1.0	.6
	sd =	(.92)	(1.16)	(.52)	(.54)
	n =	11	11	8	4
	(F = .6329, NS at 1%, df = 3/30)				
Math Computation	$\bar{X}$ =	.4	1.3	1.4	.5
	sd =	(.76)	(1.38)	(.71)	(1.62)
	n =	11	10	8	4
	(F = 1.9730, NS at 1%, df = 3/29)				
Math Concepts	$\bar{X}$ =	.5	1.0	1.7	.8
	sd =	(1.36)	(1.69)	(1.09)	(.70)
	n =	11	10	8	4
	(F = 1.3251, NS at 1%, df = 3/29)				
Math Problem Solving	$\bar{X}$ =	1.0	.7	1.0	.7
	sd =	(2.37)	(1.55)	(.69)	(.97)
	n =	11	10	7	4
	(F = .0624, NS at 1%, df = 3/28)				
Total Math	$\bar{X}$ =	.2	.8	1.0	.3
	sd =	(.92)	(1.04)	(.58)	(.74)
	n =	17	14	10	6
	(F = 2.3775, NS at 1%, df 3/43)				

The Weschler Performance Scale was administered to all subjects in 1971. Figure 41 reveals that a statistically significant difference exists between good and poor achievers when intellectual functioning is measured using a performance test.

Figure 41: COMPARISON OF WESCHLER PERFORMANCE SCALE SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

	Good Achievers	Poor Achievers
WISC IQ	$\bar{X}$ = 107 sd = (10.7) n = 39	$\bar{X}$ = 100 sd = (12.4) n = 18
	(t = 2.100)**	
Picture Completion (Scale Score)	$\bar{X}$ = 10.3 sd = (2.73) n = 39	$\bar{X}$ = 8.6 sd = (3.26) n = 18
	(t = 1.989)**	
Coding (Scale Score)	$\bar{X}$ = 11.2 sd = (2.61) n = 39	$\bar{X}$ = 9.7 sd = (2.05) n = 18
	(t = 2.118)**	

* Sig. at .01
**Sig. at .05

The mean scores for both groups are within normal limits of intelligence, however, the poor achieving groups had the lowest mean score. The only two subtests of performance groups that were statistically different are the Picture Completion and Coding subtests. The psychologist's narrative reports were compared to determine which factors were outstanding for poor achievers. The results were as follows:

GOOD ACHIEVERS		POOR ACHIEVERS
Social Sense (n=14)	14% of the subjects where this factor was abnormal	38% (n=16)
Visual Alertness (n=20)	25%	41% (n=17)
Visual Motor (n=18)	0%	31% (n=16)
Abstract Reasoning (n=17)	5%	9% (n=11)
Failure & Success (n=20)	50%	68% (n=13)
Visual Acuity (n=21)	24%	37% (n=16)
Subtest Range (n=20)	65%	61% (n=16)

The psychologist's report characterizes a greater percentage of poor achievers as demonstrating "abnormal" reactions in the areas of social skills, visual alertness, visual motor skills, reaction to failure and success and visual acuity. These observations resulted from interactions with each child and suggest the possibility that neurological integrity is not as expected. More interesting is the number of children displaying aggressive and withdrawn behavior in compromising situations as they developed during the test session. For example, the poor achievers had considerable difficulty with the Picture Completion subtest. When they could not identify the missing part of the picture their immediate reaction was to quit or "shotgun" the problem by providing many solutions. The question arises as to whether children with mild hearing loss become suspicious, withdrawn individuals as their adult counterparts. It is possible that having a hearing loss and stumbling through aural experiences results in trying all solutions all the time since one is never sure what the question is because the auditory mechanism does not make it precise. These findings strongly suggest that children who are poor achievers will display

behavior that is unusually extreme in a learning situation. It also suggests that visual acuity be evaluated.

An attempt was made to further substantiate the withdrawal syndrome by administering a self-concept inventory. The Piers-Harris Scale was administered in 1971 and repeated in 1972. This test is designed to measure whether children have a positive or negative self-concept. Figure 42 provides a summary of these findings which suggests that no differences between good and poor achievers were evident.

Figure 42: COMPARISON OF PIERS-HARRIS SCALE FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

	Good Achievers	Poor Achievers
Piers-Harris		
1971 Raw Score	$\bar{X}$ = 22.9 sd = (3.95) n = 30 (t = .397)	$\bar{X}$ = 22.4 sd = (3.88) n = 14
1972 Raw Score	$\bar{X}$ = 23.7 sd = (4.65) n = 33 (t = .629)	$\bar{X}$ = 22.8 sd = (5.57) n = 18

The Peabody Picture Vocabulary test was administered to the entire project sample in October of 1971 and repeated again in June of 1972. Figure 43 reveals that both groups of achievers were within the limits of "normal" intelligence as measured by this method; however, the poor achievers scored significantly lower on both test sessions. This finding is in agreement with the Word Knowledge subtest of the Metropolitan Achievement test which suggested that vocabulary differences were present in 1971 and persisted until 1974. It should be noted that both raw scores and scale scores were significantly different also.

Figure 43: COMPARISON OF PEABODY PICTURE VOCABULARY SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

	Good Achievers	Poor Achievers
Peabody IQ (Oct., 1971)	$\bar{X}$ = 100 sd = (18.89) n = 39	$\bar{X}$ = 86 sd = (16.17) n = 18
	(t = 2.764)*	
Peabody IQ (June, 1972)	$\bar{X}$ = 97 sd = (15.51) n = 39	$\bar{X}$ = 89 sd = (16.09) n = 18
	(t = 1.827)**	

* Sig. at .01
**Sig. at .05

The poor achievers demonstrated less potential on both performance and language based tests. Even though mean scores were within the normal range individual children who demonstrated these findings in addition to a mild hearing loss should be viewed as potential academic failures.

Syntax is an aspect of language development that can be grossly estimated with the Northwestern Syntax Screening test. The Expressive and Receptive batteries were administered to the project children in 1971 and repeated in 1972. The duration of time between testing sessions was approximately 16-18 months. The same person administered the test on both occasions following the procedure described in the test manual. Even though this group of children was at age limit for the test, it was felt that the scores would be of value. Figures 44 and 45 reveal that mean age in 1971 was approximately eight-and-a-half years for both groups. The results of this testing revealed that significant differences did exist between groups for the Receptive and Expressive raw score in 1971. These differences were less the four raw score points.

Figure 44: COMPARISON OF NORTHWESTERN SYNTAX SCREENING TEST RAW SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: EXPRESSIVE

	Good Achievers	Poor Achievers
C.A. 1971	$\bar{X}$ = 100.2(Months) sd = (16.2) n = 34	$\bar{X}$ = 105.3 sd = (22.8) n = 18
	(t = .925)	
NSST 1971 Expressive:		
Raw Score	$\bar{X}$ = 31.9 sd = (5.52) n = 34	$\bar{X}$ = 27.4 sd = (8.13) n = 18
	(t = 2.334)**	
1972 Expressive:		
Raw Score	$\bar{X}$ = 35.4 sd = (4.19) n = 34	$\bar{X}$ = 33.1 sd = (5.64) n = 18
	(t = 1.690)	

**Sig. at .05

Figure 45: COMPARISON OF NORTHWESTERN SYNTAX SCREENING TEST RAW SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECEPTIVE

	Good Achievers	Poor Achievers
C.A. 1971	$\bar{X}$ = 100.2(Months) sd = (16.2) n = 34	$\bar{X}$ = 105.3 sd = (22.8) n = 18
	(t = .925)	
NSST 1971 Receptive:		
Raw Score	$\bar{X}$ = 33.4 sd = (4.39) n = 34	$\bar{X}$ = 30.5 sd = (5.25) n = 18
	(t = 2.131)**	
1972 Receptive:		
Raw Score	$\bar{X}$ = 36.3 sd = (2.77) n = 34	$\bar{X}$ = 34.7 sd = (4.55) n = 18
	(t = 1.577)	

**Sig. at .05

When these scores were expressed in percentiles, the differences were not significant (see Figure 46).

Figure 46: COMPARISON OF NORTHWESTERN SYNTAX SCREENING TEST PERCENTILE RATING FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

	Good Achievers	Poor Achievers
Receptive:		
Percentile (1971)	$\bar{X}$ = 25	$\bar{X}$ = 15
(1972)	$\bar{X}$ = 33	$\bar{X}$ = 31
Expressive:		
Percentile (1971)	$\bar{X}$ = 25	$\bar{X}$ = 16
(1972)	$\bar{X}$ = 42	$\bar{X}$ = 32

(There are no stat. significant differences between these scores .01 or .05)

The 1972 raw scores for both the Receptive and Expressive scales were not significantly different. Since raw scores did not change between years to any remarkable degree, it is felt that these differences probably are not of consequence between these two groups of children. It is of interest to note that despite a chronological age of nine in the 1972 test year, the highest percentile achieved was on the Expressive scale of 42, (see Figure 46). It should be pointed out that good achievers were making excellent progress in school as measured by the Metropolitan Achievement test and indicated by teacher grades. This may indicate that this test or possibly this skill (syntax) is not essential to successful achievement in elementary school.

An oral sample was taken from all project children in 1971 and again in 1973. Children responded to pictures and conversation; their output was tape recorded. The recordings were transferred to computer forms and the data analyzed. There were no statistically significant differences between good and poor achievers on any part of this analysis (see Figures 47, 48, 49, 50, 51). Figure 47 reveals that mean total output of words in the 1971 sample was almost identical for both groups. Despite using a more elaborate sampling method in 1973, the same results were obtained in that no difference between groups existed. Words Not Common, Average Sentence Length, Words Used Once, Different Words and Average Words Per Sentence were not found to be different. This may suggest that both groups of children come to school with the same superficial language structure, but poor achievers either have no depth to their vocabulary or they do not "learn" or "apply" their accumulation of skills when faced with classroom activities.

Figure 47: COMPARISON OF TWO ORAL LANGUAGE SAMPLES FOR CHILDREN WITH MILD HEARING LOSS WHO WERE GOOD ACHIEVERS AND POOR ACHIEVERS

		Good Achievers	Poor Achievers
Total Words	1971	$\bar{X}$ = 221 sd = (1.45) n = 30	$\bar{X}$ = 223 sd = (1.16) n = 14
		(t = 1.045)	
	1973	$\bar{X}$ = 428 sd = (1.96) n = 30	$\bar{X}$ = 501 sd = (2.03) n = 14
		(t = 1.142)	
Words Not Common	1971	$\bar{X}$ = 3.0 sd = (3.66) n = 30	$\bar{X}$ = 2.6 sd = (2.06) n = 14
		(t = .371)	
	1973	$\bar{X}$ = 1.7 sd = (1.80) n = 30	$\bar{X}$ = 2.4 sd = (1.82) n = 14
		(t = 1.122)	

Figure 48: COMPARISON OF TWO ORAL LANGUAGE SAMPLES FOR CHILDREN WITH MILD HEARING LOSS WHO WERE GOOD ACHIEVERS AND POOR ACHIEVERS

		Good Achievers	Poor Achievers
Words Used Once	1971	$\bar{X}$ = 60.9 sd = (28.66) n = 30 (t = .205)	$\bar{X}$ = 59.1 sd = (21.04) n = 14
	1973	$\bar{X}$ = 116.2 sd = (36.75) n = 30 (t = 0.632)	$\bar{X}$ = 123.6 sd = (34.94) n = 14
Different Words	1971	$\bar{X}$ = 96.9 sd = (50.92) n = 30 (t = .213)	$\bar{X}$ = 93.6 sd = (35.82) n = 14
	1973	$\bar{X}$ = 187.3 sd = (65.48) n = 30 (t = 1.841)	$\bar{X}$ = 205.0 sd = (64.37) n = 14

Figure 49: COMPARISON OF TWO ORAL LANGUAGE SAMPLES FOR CHILDREN WITH MILD HEARING LOSS WHO WERE GOOD ACHIEVERS AND POOR ACHIEVERS

Average Sentence Length	1971	$\bar{X}$ = 8.7 sd = (3.83) n = 30 (t = .610)	$\bar{X}$ = 8.0 sd = (2.29) n = 14
	1973	$\bar{X}$ = 9.0 sd = (2.05) n = 30 (t = .547)	$\bar{X}$ = 8.6 sd = (2.26) n = 14
XC 50	1971	$\bar{X}$ = 4.3 sd = (.35) n = 30 (t = .610)	$\bar{X}$ = 4.2 sd = (.24) n = 14
	1973	$\bar{X}$ = 4.7 sd = (.25) n = 30 (t = .348)	$\bar{X}$ = 4.6 sd = (.32) n = 14

Figure 50: COMPARISON OF TWO ORAL LANGUAGE SAMPLES FOR CHILDREN WITH MILD HEARING LOSS WHO WERE GOOD ACHIEVERS AND POOR ACHIEVERS

		Good Achievers	Poor Achievers
Average Per Sentence	1971	$\bar{X}$ = .13 sd = (.22) n = 30 (t = .375)	$\bar{X}$ = .11 sd = (.11) n = 14
	1973	$\bar{X}$ = .35 sd = (.19) n = 30 (t = .629)	$\bar{X}$ = .31 sd = (.15) n = 14
Not Common Words Once	1971	$\bar{X}$ = 1.7 sd = (1.80) n = 30 (t = -1.122)	$\bar{X}$ = 2.4 sd = (1.82) n = 14
	1973	$\bar{X}$ = 9.3 sd = (4.16) n = 30 (t = .283)	$\bar{X}$ = 8.9 sd = (4.10) n = 14

Figure 51: COMPARISON OF TWO ORAL LANGUAGE SAMPLES FOR CHILDREN WITH MILD HEARING LOSS WHO WERE GOOD ACHIEVERS AND POOR ACHIEVERS

		Good Achievers	Poor Achievers
Ratio Difference to Total	1971	$\bar{X}$ = .47 sd = (.10) n = 30 (t = -0.148)	$\bar{X}$ = .47 sd = (.10) n = 14
	1973	$\bar{X}$ = 1.9 sd = (7.58) n = 30 (t = .695)	$\bar{X}$ = .45 sd = (.122) n = 14

The design of this research project provided for three experimental groups and a control group. The primary purpose for this design was to be able to compare the educational gains of children who were treated with those who were not. The treatment consisted of three procedures administered in various degrees to each group. Teacher-counselor service, viewing by the teacher of a four-part A-V program called, "An Experience in Deafness," and use of FM wireless amplification equipment by teacher and children comprised the treatment package. Group I received all treatment procedures, Group II received only the A-V and FM treatments and Group III, the FM units only. Essentially, these treatments were used because it was felt that practical solutions that could be used by classroom teachers should be explored. The teacher-counselor treatment was essentially one of remediation. The A-V program attempted to improve the "visibility" of the hearing loss, and the FM unit was used to improve hearing and provide the child with an equal opportunity to learn through his ears.

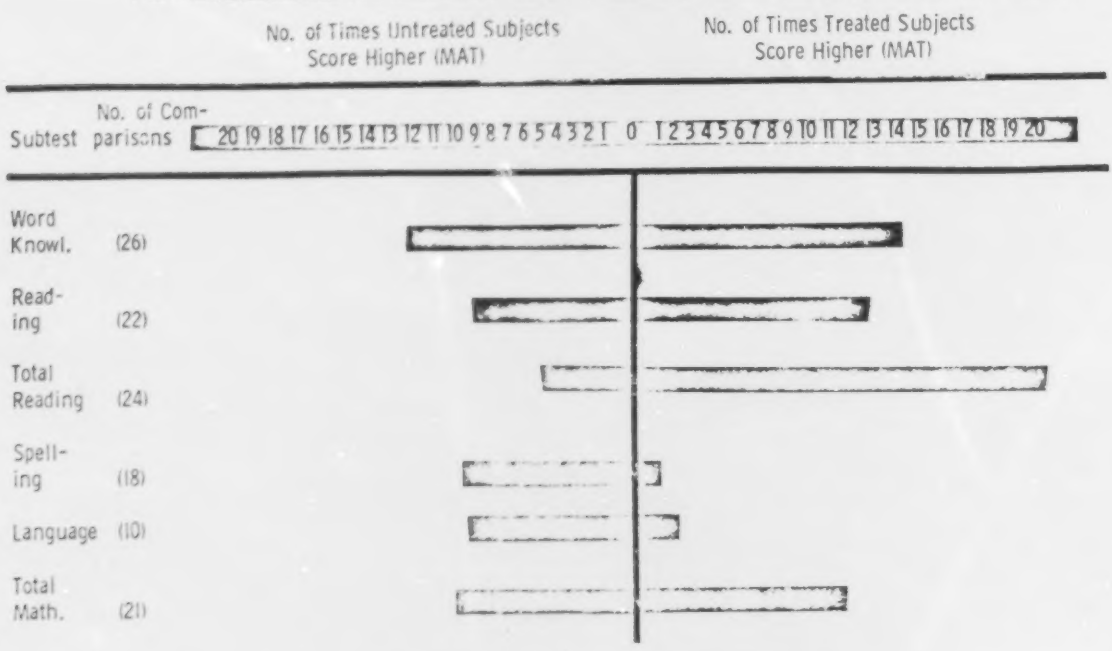
Academic achievement gains were compared for the three experimental and the control groups. Figure 52 reveals there were no statistically significant differences between groups when achievement gains were compared in 1972-73.

Figure 52: COMPARISON OF MEAN GAIN FOR METROPOLITAN ACHIEVEMENT SUBTEST BY GROUPS (JUNE 1972 TO JUNE 1973)

		Group I	Group II	Group III	Group IV
Word Knowledge	$\bar{X}$ =	.3	.6	1.0	.4
	sd =	(.8)	(1.5)	(.8)	(.8)
	n =	16	9	10	14
		(df = 3/45, F = 1.21)			
Reading	X =	1.0	.3	1.2	.4
	sd =	(.9)	(.8)	(1.0)	(1.1)
	n =	16	9	10	14
		(df = 3/45, F = 1.59)			
Total Reading	$\bar{X}$ =	.6	.2	1.0	.5
	sd =	(.6)	(.4)	(.6)	(1.0)
	n =	16	9	10	14
		(df = 3/45, F = 2.2)			
Language	$\bar{X}$ =	.6	1.6	1.1	1.4
	sd =	(.5)	(.7)	(1.0)	(1.6)
	n =	8	6	6	8
		(df = 3/24, F = 1.32)			
Spelling	$\bar{X}$ =	.5	.5	1.2	.5
	sd =	(.9)	(.7)	(1.2)	(.6)
	n =	12	8	10	12
		(df = 3/38, F = 1.54)			
Math Computation	$\bar{X}$ =	.5	.6	.9	1.1
	sd =	(1.3)	(.8)	(1.3)	(1.2)
	n =	12	8	10	12
		(df = 3/38, F = .69)			
Math Concepts	$\bar{X}$ =	.2	.9	.8	1.3
	sd =	(1.4)	(.9)	(1.6)	(1.6)
	n =	13	9	10	13
		(df = 3/41, F = 1.32)			
Math Problems	$\bar{X}$ =	.2	.7	1.1	1.2
	sd =	(1.2)	(1.3)	(1.5)	(.7)
	n =	12	8	10	12
		(df = 3/38, F = 2.05)			
Total Math	$\bar{X}$ =	.4	.9	1.1	1.0
	sd =	(1.0)	(1.0)	(1.2)	(1.0)
	n =	15	8	10	13
		(df = 3.42, F = 1.30)			

Two-thirds or 66% of the children included in the project sample have been described as being academically successful. Since this finding was not evident at the onset of the project, it is possible that improvement in achievement could not be expected due to the treatments administered to the children in the various groups. Also, the wide range of achievement skill found in the sample had a tendency to make the mean score equal, especially since the number of subjects was so small in each group. It was therefore determined that group comparison might be made in a different manner. A comparison of children who were treated and untreated was made by matching their achievement levels on the Metropolitan in 1971 for each subtest. Figure 53 reveals that twenty-two children who had the same grade level achievement in reading in 1971 were compared. Twelve of these treated children or 54% had a greater achievement gain than untreated subjects.

Figure 53: COMPARISONS OF ACHIEVEMENT GAINS FOR TREATED AND UNTREATED SUBJECTS WHO HAD SIMILAR GRADE LEVEL ACHIEVEMENT ON BASELINE TESTS IN 1971


No. of Times Untreated Subjects Score Higher (MAT)
No. of Times Treated Subjects Score Higher (MAT)
Subtest
No. of Comparisons
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Word Knowl. (26)
Reading (22)
Total Reading (24)
Spelling (18)
Language (10)
Total Math. (21)

A comparison of all children who started at the same achievement level was made and a tendency for the treated group to out-perform the control groups were noted (see Figure 54). These differences were more evident in the total Reading category and Language areas than in the Math area.

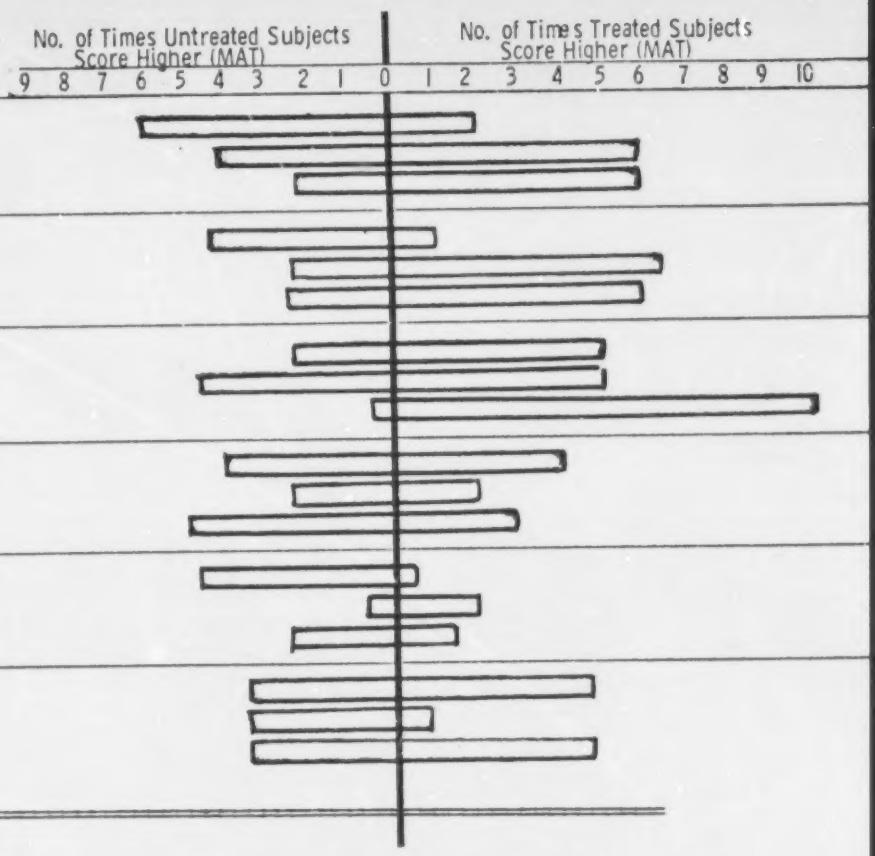
Figure 54: SUMMARY OF ACHIEVEMENT GAINS FOR TREATED AND UNTREATED SUBJECTS WHO HAD SIMILAR GRADE LEVEL ACHIEVEMENT SCORES IN 1971

Subtest	Percentage of Time Treated Subjects Had Greater Achievement Gains than Untreated Subjects
Word Knowledge	55%
Reading	59%
Total Reading	88%
Spelling	50%
Language	25%
Total Math	52%

A comparison by treatment groups using matched pairs suggest that Groups II and III made greater achievement gains than Group I when compared to the control group (see Figure 55).

Figure 55: COMPARISON BY GROUPS OF ACHIEVEMENT GAINS FOR MATCHED PAIRS

SUBTEST	GROUP	NO. OF COMPARISONS
Word Knowl.	IV vs I	(8)
	IV vs II	(10)
	IV vs III	(8)
Reading	IV vs I	(5)
	IV vs II	(9)
	IV vs III	(8)
Total Reading	IV vs I	(6)
	IV vs II	(8)
	IV vs III	(10)
Spelling	IV vs I	(7)
	IV vs II	(4)
	IV vs III	(7)
Language	IV vs I	(5)
	IV vs II	(2)
	IV vs III	(3)
Total Math	IV vs I	(8)
	IV vs II	(4)
	IV vs III	(9)



These findings would suggest greater achievement was found in treated subjects but does not overwhelmingly suggest which treatment is the best combination for these children. Apparently improving the "visibility" of the hearing loss and improving the child's ability to hear were beneficial to these children. There are many reasons to suspect the "purity"of the treatment procedures since it is impossible to control all of the variables in a classroom for three different school years. However, our personal experiences, anecdotal records, as well as objective data, suggest that all three forms of treatment studied are appropriate for children. The type of intervention necessary is dependent on each child's needs and should be re-evaluated each school year.

Classroom teachers responded to a questionnaire administered on several occasions throughout the project. Questions relating to hearing, behavior, achievement, emotional status were presented (see Appendix B, Figure). A comparison of teacher comments for good and poor achievers revealed the following:

A. Teachers rated a higher percentage of poor achievers as below average in overall academic performance.

B. Teachers indicated a higher percentage of poor achievers were not learning in school because of their hearing loss.

C. A high percentage of poor achievers received low ratings in following directions, answering questions, keeping place in a book, attention span and attentiveness.

D. A higher percentage of poor achievers were rated as "withdrawn."

E. Teachers' comments as to achievers' reactions during periods of stress were as follows: gets angry, cries more than others, poor performance, intense concentration, sullen.

Teachers' comments as to good achievers' reactions during periods of stress were as follows: not obvious, average, normal, well adjusted, tearful eyes, blushes, confusion.

F. Poor achievers are more reluctant to participate in classroom discussion.

G. Poor achievers have more problems hearing at a distance.

It is interesting to note that teacher rating and achievement testing are in agreement as to which children perform academic tasks poorly. Teacher ratings also reinforce the idea that behavior extremes are more prevalent in the poor achieving group. This behavior is apparently present at age five or six and is probably detectable. Obviously a combination of mild sensorineural hearing loss, low normal intelligence, deficiences in vocabulary skills and any type of visual motor disorganization would lead the investigator to predict a poor academic prognosis.

The educational significance of a mild sensorineural hearing loss should be established by conducting the following:

1. Clinical activities:
   (a) Routine audiometric studies
   (b) Discrimination testing in sound field
   (c) Psychological testing
   (d) Baseline achievement testing
2. Assessment of condition at school:
   (a) Viewing of A-V unit at school by teacher
   (b) Testing listening skill by teacher at school (Management Guides 1-5)
   (c) Conference with audiologist by phone or in person to discuss the results

The primary objective of these activities is to increase or decrease the "visibility" of the hearing loss. The classroom teacher can then make appropriate accommodations for this child if the hearing loss is seen as significant or she can dismiss the significance of this problem. It is possible that a hearing loss may only cause communication problems and not interfere with learning. The hearing loss may be considered as a cause of poor achievement. It would appear that classroom teachers are in the best position to assess this factor. Applying some of the methods and techniques suggested by this ESEA Title III project may be helpful in making these decisions.

FINAL REPORT, 1975

ESEA TITLE III PROJECT:

THE HARD OF HEARING CHILD IN THE REGULAR CLASSROOM

APPENDIX A

MANAGEMENT GUIDE 1

CONCERNING HEARING IMPAIRED CHILDREN FOR THE SCHOOL PRINCIPAL

Produced by ESEA Title III, Oakland Schools.
Project (0661): THE HARD OF HEARING CHILD
IN THE REGULAR CLASSROOM
Dr. R. L. Paul, Director
Mrs. Beth Young, Assistant Director

THE PROCEDURES OUTLINED IN THE ACCOMPANYING MANAGEMENT GUIDES ARE SUGGESTED FOR CHILDREN WHO ARE REPORTED TO HAVE PERMANENT HEARING LOSS. THESE ACTIVITIES SHOULD BE CONDUCTED BY THE CLASSROOM TEACHER.

I. SELECTING A REGULAR CLASSROOM TEACHER FOR A HEARING IMPAIRED CHILD IF THERE IS A CHOICE!

1. The teacher's speech should be appropriately loud.
2. The teacher should have good articulation of speech.
3. The teacher should be easy to lipread.
4. The teacher should have good control of children in the classroom so that noise levels are not excessive.
5. The teacher should be one who is willing to make adaptations.
6. The teacher should be one who uses visual reinforcements extensively.
7. The teacher should have normal hearing.

II. TEACHERS AND OTHER STAFF INVOLVED IN THE EDUCATIONAL PROGRAM OF THE HEARING IMPAIRED CHILD SHOULD VIEW THE A-V PROGRAM, "AN EXPERIENCE IN DEAFNESS."

III. PROCEDURES INCLUDED IN THIS KIT SHOULD BE COMPLETED.

_____ is the hearing loss significant
(Guide #5)

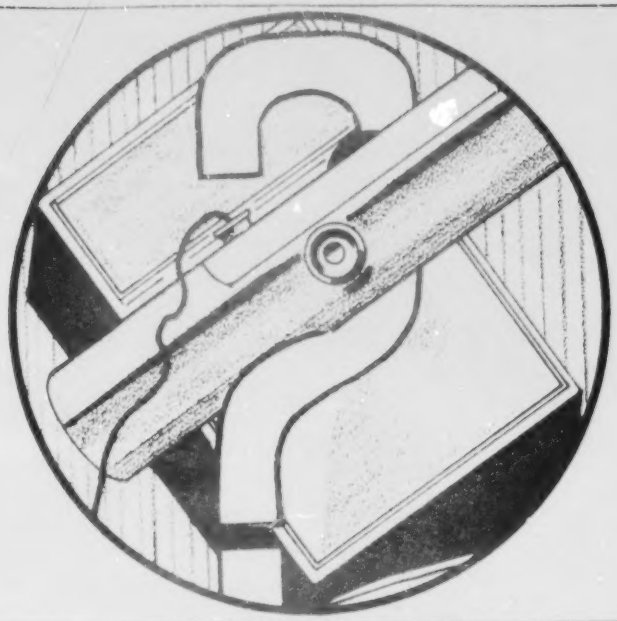
_____ does he need a wireless
(Guide #2)

_____ monitoring academic achievement
(Guide #4)

IV. IF IT IS DEMONSTRATED THAT A CHILD MIGHT BENEFIT FROM A WIRELESS TRANSMITTER (SEE GUIDE # 2), IN THE STATE OF MICHIGAN, THIS UNIT CAN BE OBTAINED AND REIMBURSED FROM FUNDS FOR THE PHYSICALLY HANDICAPPED. APPROXIMATELY 62% (1974) OF THE COST IS REIMBURSABLE. A UNIT CAN BE OBTAINED THROUGH THE STATE DEPARTMENT OF EDUCATION BY FILING FORM SE 4984 WITH THE INTERMEDIATE SCHOOL DISTRICT. (THIS FORM CAN BE OBTAINED FROM THE INTERMEDIATE SCHOOL DISTRICT).

MANAGEMENT GUIDE 2

IS THIS HEARING IMPAIRED CHILD A CANDIDATE FOR A WIRELESS TRANSMITTING DEVICE TO BE USED IN A REGULAR CLASSROOM?



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IN THE REGULAR CLASSROOM
Dr. R. L. Paul, Director
Mrs. Beth Young, Assistant Director

GUIDELINES FOR SELECTING A CANDIDATE FOR WIRELESS TRANSMITTER USE:

1. Does he have a hearing loss greater than 30dB at 1000 Hz or a speech reception threshold (SRT) 30dB or greater?

   Circle one: Yes No Uncertain

2. Does he have a significant problem hearing his classroom teacher (in her opinion)?

   Circle one: Yes No Uncertain

3. Is the listening score for the PBK word list below 70% when no amplifier is used?

   Circle one: Yes No Uncertain

4. Does he currently wear a hearing aid?

   Circle one: Yes No Uncertain

5. Does he wear it every day?

   Circle one: Yes No Uncertain

6. Does it work every day?

   Circle one: Yes No Uncertain

7. Would his teacher be willing to use this equipment?

   Circle one: Yes No Uncertain

8. Would child be interested in this device?

Circle one: Yes No Uncertain

9. What do the parents think of this idea?

Circle one: Yes No Uncertain

Who can supervise the use of this instrument?

_____ Classroom teacher

_____ Teacher of deaf

_____ Speech pathologist

_____ Educational audiologist

_____ Parent

_____ Principal

_____ Teacher Counselor

_____ Others

CHILDREN WITH HEARING IMPAIRMENT WHO HAVE BEEN SUCCESSFUL USERS OF THIS EQUIPMENT IN REGULAR CLASSROOMS WOULD GET POSITIVE RESPONSES TO ALMOST ALL OF THESE QUESTIONS!

Successful users of this equipment have:

(1) Demonstrated a need by poor discrimination scores.

(2) Teachers have noted the loss of hearing.

(3) Teachers have been willing to try!

(4) Parents have been interested.

(5) Someone (teacher counselor, speech therapist, educational audiologist, teacher of deaf, etc.) must be responsible for checking on the use of this equipment on at least a weekly basis).

(6) The unit "must" be kept in perfect operating condition at all times!

(7) The greater the "visibility" of the deafness (greater the hearing loss), the easier it will be to get daily cooperation from teachers and children.

(8) The milder the hearing loss (less visibility) the greater problem encountered in obtaining cooperation from teachers and children.

IF IT IS DEMONSTRATED THAT A CHILD MIGHT BENEFIT FROM A WIRELESS TRANSMITTER (SEE GUIDE # 2), IN THE STATE OF MICHIGAN, THIS UNIT CAN BE OBTAINED AND REIMBURSED FROM FUNDS FOR THE PHYSICALLY HANDICAPPED. APPROXIMATELY 62% (1974) OF THE COST IS REIMBURSABLE. A UNIT CAN BE OBTAINED THROUGH THE STATE DEPARTMENT OF EDUCATION BY FILING FORM SE 4984 WITH THE INTERMEDIATE SCHOOL DISTRICT. (THIS FORM CAN BE OBTAINED FROM THE INTERMEDIATE SCHOOL DISTRICT).

MANAGEMENT GUIDE 3

INTRODUCING A WIRELESS FM SYSTEM TO A REGULAR CLASSROOM TEACHER

Produced by ESEA Title III, Oakland Schools
Project (0067) THE HARD OF HEARING CHILD
IN THE REGULAR CLASSROOM
By B.E. Pollack, Director
Three Year Project, Second Year

INTRODUCING THE WIRELESS AMPLIFYING UNIT TO THE CLASSROOM TEACHER AND CHILD:

1. Prepare for the demonstration by checking the unit thoroughly before you show it to the teacher:

   ____ is it charged

   ____ do all switches work

   ____ do you have all components

2. Demonstrate: why unit is useful

   ____ have teacher wear the receiver and the child wear the microphone

   ____ use this experience to indicate that noise, movement and distance do not affect performance

3. Demonstrate: control buttons

   ____ how unit is turned on and off

   ____ how volume is increased up and down

   ____ how each receiver switch is used

   ____ how to turn on microphone

4. Demonstrate: how to use receiver and microphone -

____ how to wear the microphone

____ how child can wear the receiver (chest, on desk, in the desk, on the belt, et cetera)

____ have child wear the receiver and the teacher the microphone

____ have teacher talk (give numbers, or letters of the alphabet or make a statement) - indicate to the teacher what the child heard. "Johnny, can you hear me?" is not an appropriate question

5. Demonstrate: maintenance

A. charging

____ how to activate charger

____ how to recharge microphone

____ how to recharge receiver

____ how long to recharge

B. cleaning the earmold

C. maintenance for the cord (don't twist it)

6. Demonstrate:

A. using manufacturer's handbook, point out all parts and their function

B. how to use the unit for special events such as - film, tape recorder, et cetera

7. Schedule for use of this device:

A. wear the unit all day whenever possible

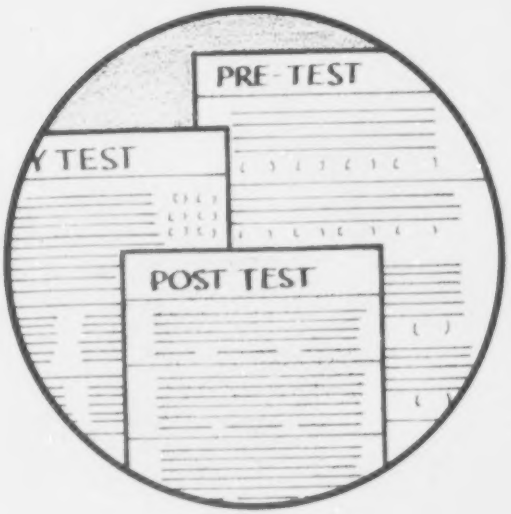
B. wear unit all a.m. or p.m.

C. wear unit for reading only or other specific subject

NOT SUGGESTED TO USE UNIT ON AN INTERMITTENT BASIS!

MANAGEMENT GUIDE 4

MONITORING ACHIEVEMENT OF THE HEARING IMPAIRED CHILD IN THE REGULAR CLASSROOM



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Project (0661): THE HARD OF HEARING CHILD
IN THE REGULAR CLASSROOM
Dr. R. L. Paul, Director
Mrs. Beth Young, Assistant Director

I. IS THE HEARING IMPAIRED CHILD IN YOUR CLASSROOM LIKE THIS?

1. Does he have a sensori-neural hearing loss?
2. Does he have low-normal intelligence?
3. Does he display symptoms of poor visual alertness and memory?
4. Is his behavior withdrawn?
5. Is his behavior aggressive?
6. Is his vocabulary deficient?
7. Is his speech normal?
8. Is this child's hearing loss "visible" - that is--is the significance of hearing loss readily apparent?

"Yes" answers to the first seven questions and "no" to the last, suggest that the hearing impaired child in your classroom is headed for academic failure.

II. HOW DOES THE HEARING IMPAIRED STUDENT RESPOND TO CONFRONTATION AND ACADEMIC PROBLEMS IN THE CLASSROOM?

1. Does he "withdraw" when he fails?
   Circle one: Yes No Uncertain
2. Does he give up easily?
   Circle one: Yes No Uncertain
3. Does he answer immediately, saying anything appropriate or inappropriate just to give an answer?
   Circle one: Yes No Uncertain
4. Does he look at other children's papers to be sure he has the right answer?
   Circle one: Yes No Uncertain

5. Is he overly dependent on the teacher for help?
   Circle one: Yes No Uncertain

Some adults and children with mild permanent sensori-neural deafness will withdraw from difficult situations because they do not hear. It is critical to recognize this so that the teacher can make appropriate educational adjustment.

III. THE FOLLOWING TESTS ARE RECOMMENDED FOR MONITORING THE ACADEMIC ACHIEVEMENT OF THE HEARING IMPAIRED CHILD IN THE REGULAR CLASSROOM.

1. Weschler Performance Scale

   (a) Good test to assess overall abilities.

   (b) Coding and Picture Completion sections seem particularly sensitive to identifying children who may experience academic problems and illustrates the nature of their problems.

2. Peabody Picture Vocabulary

   (a) Test to measure "depth" of vocabulary.

3. Gates McKillop Reading Diagnostic Tests

   (a) Especially good in diagnosing reading skills in early elementary grades.

   (b) Sensitive measure to determine if child can apply skills.

4. Gates MacGinitie Reading Tests

   (a) Good tests of vocabulary and comprehension.

   (b) Available for grades K-12.

5. Metropolitan Achievement Tests

   (a) Vocabulary subtest) Sensitive to identifying
) children who are experiencing
   Reading subtests) academic problems.

   (b) Six months gain or or less and 1½ years below grade level suggest academic failure.

IV. FORMAT TO PRESENT DATA TO CLASSROOM TEACHER:

	Date Pre-Test	Grade Equiv.	Date Post-Test	Grade Equiv.	Gain
Metropolitan Achievement Test					
Gates MacGinitie Reading Test Test					
Gates McKillop Reading Diagnostic					
Peabody Picture Vocabulary					
Weschler Performance Scale					

It is not essential that the above tests be given every year but it is essential...

1. to establish overall ability
2. to establish an academic baseline
3. to measure gain yearly

MANAGEMENT GUIDE 5

IS THIS CHILD'S HEARING LOSS CAUSING SIGNIFICANT PROBLEMS IN YOUR CLASSROOM?

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Project (0661): THE HARD OF HEARING CHILD
THE REGULAR CLASSROOM
Dr. R. L. Paul, Director
Mrs. Beth Young, Assistant Director

TEACH A LESSON IN ANY SUBJECT. MAKE THE FOLLOWING OBSERVATIONS:

1. Child's ability to answer questions during classroom discussion

(a) ___ Reading (check subject used)

___ Math

___ Language

___ Social Studies

___ Science

___ Others

(b) Rating: Poor Fair Excellent

1 2 3 4 5

(c) Approximate number of questions asked to make your decision _____

2. After giving a series of directions to all the children, such as an assignment, check his understanding of what you said.

(a) ___ Reading (check subject used)

___ Math

___ Language

___ Social Studies

___ Science

___ Others

(b) Rating: Poor Fair Excellent

1 2 3 4 5

(c) Approximate number of questions asked to make your decision _____

3. After explaining a concept, ask the hearing impaired child detailed questions regarding what he understood.

(a) ___ Reading (check subject used)

___ Math

___ Language

___ Social Studies

___ Science

___ Others

(b)Rating: Poor Fair Excellent

1 2 3 4 5

(c) Approximate number of questions asked to make your decision _____.

4. Does his written work in any way reflect that he did not hear the message?

RATING

	Low Problem			Many Problems		
(a) ___ Reading	1	2	3	4	5	
___ Math	1	2	3	4	5	(check subject used)
___ Language	1	2	3	4	5	
___ Social Studies	1	2	3	4	5	
___ Science	1	2	3	4	5	
___ Others	1	2	3	4	5	

5. To administer the enclosed listening tests, please observe these guidelines:

1. Use a normal teaching voice.

2. Stand approximately 8 feet from the hearing impaired child.

3. Do not repeat any item.

4. Children are to write the word they hear. (Correct spelling is not important; correct sounds are).

5. Administer the test to the entire class. (Tests may be administered orally to individuals).

6. Administer the word lists using the four test conditions as stated at the beginning of each list.

(a) Circle list used: 1 2 3 4

(b)Score: ___/5 ___/5 ___/5 ___/5

6. Give an overall rating to tell us whether his hearing loss is, in your opinion, interfering with learning.

No Interference Great Interference

1 2 3 4 5

Thank you!

Return to: _____

_____

HASKIN'S P-B DISCRIMINATION TEST

(See Instructions Page 4)

LIST 1	(NO HEARING AID) (NO LIPREADING)
1. please	26. smile
2. great	27. bath
3. sled	28. slip
4. pants	29. ride
5. rat	30. end
6. bad	31. pink
7. pinch	32. thank
8. such	33. take
9. bus	34. cart
10. need	35. scab
11. ways	36. lay
12. five	37. class
13. mouth	38. me
14. rag	39. dish
15. put	40. neck
16. fed	41. beef
17. fold	42. few
18. hunt	43. use
19. no	44. did
20. box	45. hit
21. are	46. pond
22. teach	47. hot
23. slice	48. own
24. is	49. bead
25. tree	50. shop

LIST 2	(NO HEARING AID) (WITH LIPREADING)
1. this	26. tow
2. ma	27. south
3. pick	28. rest
4. glove	29. tongue
5. gun	30. best
6. forth	31. reach
7. trade	32. slide
8. each	33. food
9. ask	34. new
10. wake	35. bait
11. call	36. three
12. rope	37. closed
13. night	38. kept
14. chew	39. off
15. guess	40. sick
16. wave	41. thread
17. cloud	42. day
18. good	43. feel
19. barn	44. wood
20. left	45. pig
21. ship	46. crack
22. flag	47. dime
23. gate	48. wash
24. hook	49. and
25. room	50. took

LIST 3	(HEARING AID) (NO LIPREADING)
1. laugh	26. path
2. falls	27. feed
3. paste	28. next
4. plow	29. wreck
5. page	30. waste
6. weed	31. crab
7. gray	32. peg
8. part	33. freeze
9. wait	34. race
10. fat	35. bud
11. ax	36. darn
12. cage	37. fair
13. knife	38. sack
14. turn	39. got
15. grab	40. as
16. rose	41. grew
17. lip	42. knee
18. bee	43. fresh
19. bet	44. tray
20. hm	45. cat
21. sing	46. on
22. all	47. camp
23. bless	48. find
24. suit	49. yes
25. splash	50. loud

LIST 4	(HEARING AID) (LIPREADING)
1. tire	26. most
2. seed	27. thick
3. purse	28. if
4. quick	29. them
5. room	30. sheep
6. bug	31. air
7. that	32. set
8. sell	33. dad
9. low	34. ship
10. rich	35. case
11. those	36. you
12. ache	37. may
13. black	38. choose
14. else	39. white
15. nest	40. frog
16. pay	41. bush
17. raw	42. clown
18. true	43. cab
19. hand	44. hurt
20. cost	45. pass
21. vase	46. grade
22. press	47. blind
23. hit	48. drop
24. bounce	49. leave
25. wide	50. nuts

FINAL REPORT, 1975

ESEA TITLE III PROJECT:

THE HARD OF HEARING CHILD IN THE REGULAR CLASSROOM

APPENDIX B

SUMMARY OF QUESTIONNAIRES
FOR REGULAR CLASSROOM TEACHERS
OF GOOD AND POOR ACHIEVERS

1. Did you know that you have a child with a hearing loss in your classroom?

	GOOD ACHIEVERS	POOR ACHIEVERS
Yes:	100%	88%
No:		12%

2. How did you find out this information?

3. Did anyone explain the magnitude or significance of this hearing loss to you:

	GOOD ACHIEVERS	POOR ACHIEVERS
Yes:	75%	88%
No:	25%	12%

4. What would you like to know about this child's hearing loss?

5. How would you rate the overall performance of this child?

	GOOD ACHIEVERS	POOR ACHIEVERS
Above Average:	28%	12%
Average:	72%	13%
Below Average:		75%

6. Do you think this child's hearing loss has anything to do with lack of achievement in the classroom, (if this occurs)? Yes____ No____ Please explain.

7. Please rate the child on the following items:

(a) Listening during oral instructions:	POOR 1	2	FAIR 3	4	EXCELLENT 5
1. Following directions:					
Good Achievers		9%	25%	58%	8%
Poor Achievers		25%	25%	38%	12%
2. Answering questions:					
Good Achievers		9%	41%	41%	9%
Poor Achievers		63%	25%		12%
3. Keeping his place in a book:					
Good Achievers			16%	58%	17%
Poor Achievers		12%	50%	38%	

	POOR 1	2	FAIR 3	4	EXCELLENT 5
4. Attention span:					
Good Achievers	9%		16%	67%	
Poor Achievers		22%	33%	45%	8%
5. Attentiveness					
Good Achievers	8%		16%	58%	
Poor Achievers	11%	11%	33%	45%	8%

(b) Frequency of asking his neighbor about assignments:

	GOOD ACHIEVERS	POOR ACHIEVERS
Never		13%
Seldom	75%	62%
Often	25%	25%
	(n = 12)	(n = 8)

(c) Frequency of asking teacher about assignments:

	GOOD ACHIEVERS	POOR ACHIEVERS
Never		13%
Seldom	84%	62%
Often	16%	25%

8. General behavior in the classroom:

(a) His behavior would best be described as:

	GOOD ACHIEVERS	POOR ACHIEVERS
Withdrawn		25%
Aggressive	9%	
Average	91%	75%

(b) What are his reactions during periods of stress (for example: crying, nothing remarkable, laughing, et cetera)?

9. Social relationships:

	GOOD ACHIEVERS		POOR ACHIEVERS	
(a) Does he seem happy?	100%	Yes	100%	Yes
(b) Does he daydream a great deal?	100%	No	29%	Yes
			71%	No
(c) Does he have the average number of friends?	91%	Yes	91%	Yes
	9%	No	9%	No

10. Communication in the classroom:

	GOOD ACHIEVERS		POOR ACHIEVERS	
(a) Is he willing to participate in class discussion readily?	90%	Yes	45%	Yes
	10	No	55%	No
(b) Is he ever embarrassed by his hearing loss?	46%	Yes	34%	Yes
	54%	No	66%	No
(c) Do you think he knows he has a hearing loss?	100%	Yes	100%	Yes
(d) Does he respond differently when it is noisy than when it is quiet in the classroom?	34%	Yes	12%	Yes
	66%	No	88%	No
(e) Does he respond differently when you are close to him as opposed to being across the room from him?	45%	Yes	88%	Yes
	55%	No	12%	No
(f) Does he have a tendency to try to watch your face?	70%	Yes	88%	Yes
	30%	No	12%	No
(g) Do errors in his paper work reflect a lack of ability to hear?	36%	Yes	50%	Yes
	64%	No	50%	No
(h) Have other children made any comment regarding anything that can be construed as noticing he has a problem hearing?	25%	Yes	29%	Yes
	75%	No	71%	No
(i) Have his parents said anything to you about his ability to hear?	59%	Yes	62%	Yes
	41%	No	38%	No
(j) Have you made any attempt to test his hearing to determine how well he hears you?	59%	Yes		
	41%	No		

If yes, what?

11. Comments:

SUMMARY OF PARENTS' INTERVIEW
FOR GOOD AND POOR ACHIEVERS

1. Do you know why your child has a hearing loss? YES

GOOD ACHIEVERS	POOR ACHIEVERS
73% (n = 15)	57% (n = 14)

a. Family history: YES

GOOD ACHIEVERS	POOR ACHIEVERS
20% (n = 15)	50% (n = 14)

b. Perinatal history: NEGATIVE HISTORY

GOOD ACHIEVERS	POOR ACHIEVERS
67% (n = 15)	85% (n = 14)

c. Childhood disease: USUAL CHILDHOOD DISEASES

GOOD ACHIEVERS	POOR ACHIEVERS
93% (n = 15)	92% (n = 14)

d. Rh factor: NORMAL

GOOD ACHIEVERS	POOR ACHIEVERS
80% (n = 15)	85% (n = 14)

2. Who made the diagnosis:

	GOOD ACHIEVERS	POOR ACHIEVERS
Audiologist:	40%	58%
ENT:	60%	42%

3. When was the hearing loss detected? AT AGE FIVE TO SIX

GOOD ACHIEVERS	POOR ACHIEVERS
86% 14% ↓	93% 7% ↓

4. Who was the first person to counsel you regarding his hearing loss?

	GOOD ACHIEVERS	POOR ACHIEVERS
Audiologist:	71%	75%
ENT:	29%	25%
	(n = 14)	(n = 14)

5. What did they tell you?

6. Do you think your child has hearing problems at home? YES

GOOD ACHIEVERS	POOR ACHIEVERS
78%	70%
(n = 14)	(n = 13)

7. Does he seem to have problems with his friends? YES

GOOD ACHIEVERS	POOR ACHIEVERS
47%	28%
(n = 15)	(n = 14)

8. Have relatives noticed the hearing loss? YES

GOOD ACHIEVERS	POOR ACHIEVERS
40%	64%
(n = 15)	(n = 14)

9. Does it affect his school work? YES

GOOD ACHIEVERS	POOR ACHIEVERS
46%	86%
(n = 15)	(n = 14)

10. Does he complain about his hearing? YES

GOOD ACHIEVERS	POOR ACHIEVERS
27%	14%
(n = 15)	(n = 14)

11. Has he had many earaches? YES

GOOD ACHIEVERS	POOR ACHIEVERS
14%	21%
(n = 15)	(n = 14)

12. When did he have his last hearing test?

13. How well did he do in school this year?

14. What problems came up during the school year? YES

GOOD ACHIEVERS	POOR ACHIEVERS
46% (n = 15)	28% (n = 14)

15. What are his worst subjects?

	GOOD ACHIEVERS	POOR ACHIEVERS
Arithmetic:	6	8
Spelling:	2	7
Language:	2	3
Reading:	3	6
Other:	3	

16. What are his best subjects?

	GOOD ACHIEVERS	POOR ACHIEVERS
Arithmetic:	6	5
Spelling:	6	2
Language:	1	
Reading:	6	3
Other:	7	8

17. Did the problem of his hearing ever come up? YES

GOOD ACHIEVERS	POOR ACHIEVERS
60% (n = 15)	63% (n = 14)

18. Have you ever seen the wireless FM unit that he uses?

19. Has your child said anything about this amplification equipment?

20. What is your impression of this device?

21. Do you think his hearing loss interferes with learning at school? YES

GOOD ACHIEVERS	POOR ACHIEVERS
40% (n = 15)	71% (n = 14)

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APPENDIX C

Figure 57: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: ORAL READING

Oral Reading	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 19.0 sd = (12.5) n = 39 (t = 1.918)	$\bar{X}$ = 12.5 sd = (10.5) n = 18
1972 (Raw Score)	$\bar{X}$ = 23.5 sd = (10.3) n = 39 (t = 3.008)*	$\bar{X}$ = 14.7 sd = (10.2) n = 18
1971 (Grade Equivalent)	$\bar{X}$ = 4.0 sd = (1.90) n = 39 (t = 2.351)*	$\bar{X}$ = 2.7 sd = (1.88) n = 18
1972 (Grade Equivalent)	$\bar{X}$ = 4.7 sd = (1.52) n = 39 (t = 3.479)*	$\bar{X}$ = 3.1 sd = (1.75) n = 18

*Sig. at .01

Figure 58: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: FLASH WORDS

Flash Words	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 21.1 sd = (11.7) n = 39 (t = 2.193)*	$\bar{X}$ = 13.7 sd = (12.0) n = 18
1972 (Raw Score)	$\bar{X}$ = 26.9 sd = (9.36) n = 39 (t = 2.624)*	$\bar{X}$ = 19.6 sd = (10.6) n = 18
1971 (Grade Equivalent)	$\bar{X}$ = 3.8 sd = (1.60) n = 39 (t = 2.580)*	$\bar{X}$ = 2.5 sd = (1.79) n = 18
1972 (Grade Equivalent)	$\bar{X}$ = 4.6 sd = (1.38) n = 39 (t = 2.743)*	$\bar{X}$ = 3.5 sd = (1.25) n = 18

*Sig. at .01

Figure 59: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: WORDS UNTIMED

Words Untimed	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 42.6 sd = (24.0) n = 39 (t = 2.119)*	$\bar{X}$ = 28.2 sd = (23.6) n = 18
1972 (Raw Score)	$\bar{X}$ = 55.7 sd = (20.0) n = 39 (t = 2.745)*	$\bar{X}$ = 39.3 sd = (23.2) n = 18
1971 (Grade Equivalent)	$\bar{X}$ = 3.6 sd = (1.43) n = 39 (t = 2.453)*	$\bar{X}$ = 2.6 sd = (1.54) n = 18
1972 (Grade Equivalent)	$\bar{X}$ = 4.4 sd = (1.25) n = 39 (t = 2.771)*	$\bar{X}$ = 3.5 sd = (1.18) n = 18

Figure 60: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: PHRASES

Phrases	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 18.4 sd = (9.54) n = 39 (t = 2.023)*	$\bar{X}$ = 12.7 sd = (10.8) n = 18
1972 (Raw Score)	$\bar{X}$ = 23.2 sd = (5.14) n = 39 (t = 2.818)*	$\bar{X}$ = 17.6 sd = (9.89) n = 18
1971 (Grade Equivalent)	$\bar{X}$ = 4.0 sd = (1.76) n = 39 (t = 1.843)	$\bar{X}$ = 3.0 sd = (1.92) n = 18
1972 (Grade Equivalent)	$\bar{X}$ = 4.9 sd = (1.06) n = 37 (t = 2.788)*	$\bar{X}$ = 3.9 sd = (1.70) n = 18

*Sig. at .01

Figure 61: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECOGNIZING AND BLENDING

Recognizing and Blending	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 11.5 sd = (8.42) n = 38 (t = 2.985)*	$\bar{X}$ = 4.8 sd = (6.61) n = 18
1972 (Raw Score)	$\bar{X}$ = 16.3 sd = (7.55) n = 39 (t = 2.416)*	$\bar{X}$ = 10.7 sd = (9.35) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.7 n = 37	$\bar{X}$ = 2.6 n = 18
1972 (Rating of Skill)	$\bar{X}$ = 2.9 n = 39	$\bar{X}$ = 2.8 n = 18

*** 1 = Poor Skills for Achievement Level
2 = Average Skills for Achievement Level
3 = Expected Skills for Achievement Level
* Sig. at .01

Figure 62: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: LETTER SOUNDS

Letter Sounds	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 19.9 sd = (6.86) n = 39 (t = 1.333)	$\bar{X}$ = 17.1 sd = (8.71) n = 18
1972 (Raw Score)	$\bar{X}$ = 24.0 sd = (2.81) n = 39 (t = 2.302)*	$\bar{X}$ = 21.8 sd = (4.51) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.8 n = 39	$\bar{X}$ = 2.8 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.9 n = 39	$\bar{X}$ = 3.0 n = 18

*** 1 = Poor Skills for Achievement Level
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3 = Expected Skills for Achievement Level
* Sig. at .01

Figure 63: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: CAPITAL LETTERS

Capital Letters	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 25.0 sd = (2.63) n = 39 (t = 1.400)	$\bar{X}$ = 23.5 sd = (5.36) n = 18
1972 (Raw Score)	$\bar{X}$ = 25.7 sd = (.869) n = 39 (t = .696)	$\bar{X}$ = 25.4 sd = (1.54) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.9 n = 39	$\bar{X}$ = 2.9 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.7 n = 39	$\bar{X}$ = 2.9 n = 18

*** 1= Poor Skills for Achievement Level
2= Average Skills for Achievement Level
3= Expected Skills for Achievement Level

Figure 64: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECOGNIZING LETTERS (Lower Case)

Recognizing Letters (Lower Case)	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 24.4 sd = (4.7) n = 39 (t = 1.402)	$\bar{X}$ = 22.5 sd = (6.24) n = 18
1972 (Raw Score)	$\bar{X}$ = 25.3 sd = (2.90) n = 39 (t = .746)	$\bar{X}$ = 24.7 sd = (1.90) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.8 n = 39	$\bar{X}$ = 2.9 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.7 n = 39	$\bar{X}$ = 2.7 n = 18

*** 1= Poor Skills for Achievement Level
2= Average Skills for Achievement Level
3= Expected Skills for Achievement Level

Figure 65: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECOGNIZING NONSENSE WORDS

Recognizing Nonsense Words	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 13.3 sd = (5.34) n = 39 (t = 1.663)	$\bar{X}$ = 10.6 sd = (6.43) n = 18
1972 (Raw Score)	$\bar{X}$ = 15.9 sd = (4.01) n = 39 (t = 2.470)*	$\bar{X}$ = 12.7 sd = (5.46) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.7 n = 39	$\bar{X}$ = 2.7 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.7 n = 39	$\bar{X}$ = 2.8 n = 18

*** 1 = Poor Skills for Achievement Level
2 = Average Skills for Achievement Level
3 = Expected Skills for Achievement Level
* Sig. at .01

Figure 66: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECOGNIZING INITIAL LETTERS

Recognizing Initial Letters	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 16.1 sd = (3.82) n = 39 (t = 2.136)*	$\bar{X}$ = 13.1 sd = (6.97) n = 18
1972 (Raw Score)	$\bar{X}$ = 17.7 sd = (2.26) n = 39 (t = 2.026)*	$\bar{X}$ = 16.0 sd = (4.26) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.7 n = 39	$\bar{X}$ = 2.6 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.6 n = 39	$\bar{X}$ = 2.5 n = 18

*** 1 = Poor Skills for Achievement Level
2 = Average Skills for Achievement Level
3 = Expected Skills for Achievement Level
* Sig. at .01

Figure 67: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECOGNIZING FINAL SOUNDS

Recognizing Final Sounds	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 11.2 sd = (3.24) n = 39 (t = 1.406)	$\bar{X}$ = 9.6 sd = (5.46) n = 18
1972 (Raw Score)	$\bar{X}$ = 12.8 sd = (1.89) n = 39 (t = 2.677)*	$\bar{X}$ = 10.6 sd = (4.30) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.6 n = 39	$\bar{X}$ = 2.7 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.6 n = 39	$\bar{X}$ = 2.7 n = 18

*** 1 = Poor Skills for Achievement Level
2 = Average Skills for Achievement Level
3 = Expected Skills for Achievement Level
* Sig. at .01

Figure 68: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: RECOGNIZING VOWELS

Recognizing Vowels	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 7.2 sd = (2.43) n = 39 (t = 3.130)*	$\bar{X}$ = 4.8 sd = (3.11) n = 18
1972 (Raw Score)	$\bar{X}$ = 8.6 sd = (2.07) n = 39 (t = 3.733)*	$\bar{X}$ = 5.7 sd = (3.79) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 3.0 n = 39	$\bar{X}$ = 2.9 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.9 n = 39	$\bar{X}$ = 2.8 n = 18

*** 1 = Poor Skills for Achievement Level
2 = Average Skills for Achievement Level
3 = Expected Skills for Achievement Level
* Sig. at .01

Figure 69: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: AUDITORY BLENDING

Auditory Blending	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 9.6 sd = (4.37) n = 38 (t = 1.579)	$\bar{X}$ = 7.5 sd = (5.39) n = 18
1972 (Raw Score)	$\bar{X}$ = 12.3 sd = (4.06) n = 39 (t = 1.775)	$\bar{X}$ = 10.1 sd = (4.61) n = 18
1971 (Rating of Skill)***	$\bar{X}$ = 2.4 n = 38	$\bar{X}$ = 2.4 n = 18
1972 (Rating of Skill)***	$\bar{X}$ = 2.3 n = 39	$\bar{X}$ = 2.7 n = 18

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2 = Average Skills for Achievement Level
3 = Expected Skills for Achievement Level

Figure 70: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: SPELLING

Spelling	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 12.1 sd = (6.93) n = 38 (t = 2.074)**	$\bar{X}$ = 8.1 sd = (6.26) n = 18
1972 (Raw Score)	$\bar{X}$ = 15.9 sd = (7.18) n = 39 (t = 2.418)*	$\bar{X}$ = 10.9 sd = (7.33) n = 18
1971 (Grade Equivalent)	$\bar{X}$ = 3.6 sd = (1.39) n = 38 (t = 2.159)**	$\bar{X}$ = 2.8 sd = (1.04) n = 18
1972 (Grade Equivalent)	$\bar{X}$ = 4.4 sd = (1.63) n = 39 (t = 2.267)*	$\bar{X}$ = 3.4 sd = (1.43) n = 18

**Sig. at .05
*Sig. at .01

Figure 71: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: SYLLABICATION

Syllabication	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 7.7 sd = (6.65) n = 53 (t = 1.657)	$\bar{X}$ = 4.6 sd = (5.74) n = 38
1972 (Raw Score)	$\bar{X}$ = 13.8 sd = (7.23) n = 55 (t = 1.814)	$\bar{X}$ = 9.9 sd = (7.90) n = 39
1971 (Rating of Skill)***	$\bar{X}$ = 2.5 n = 53	$\bar{X}$ = 2.8 n = 38
1972 (Rating of Skill)***	$\bar{X}$ = 2.9 n = 55	$\bar{X}$ = 2.9 n = 39

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3 = Expected Skills for Achievement Level

Figure 72: COMPARISON OF GATES-McKILLOP READING SUBTEST FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN: AUDITORY DISCRIMINATION

Auditory Discrimination	Good Achievers	Poor Achievers
1971 (Raw Score)	$\bar{X}$ = 12.7 sd = (9.91) n = 53 (t = .899)	$\bar{X}$ = 10.5 sd = (2.74) n = 38
1972 (Raw Score)	$\bar{X}$ = 11.5 sd = (9.91) n = 55 (t = .895)	$\bar{X}$ = 11.1 sd = (2.74) n = 39

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APPENDIX D

Figure 56: COMPARISON OF WIDE RANGE ACHIEVEMENT SCORES FOR TWO GROUPS OF HEARING IMPAIRED CHILDREN

Wide Range Achievement Test, 1971	Good Achievers	Poor Achievers
Reading	$\bar{X}$ = 3.9 sd = (2.10) n = 38 (t = 1.547)	$\bar{X}$ = 3.0 sd = (1.52) n = 16
Spelling	$\bar{X}$ = 3.3 sd = (1.88) n = 38 (t = 1.386)	$\bar{X}$ = 2.6 sd = (1.22) n = 16
Math	$\bar{X}$ = 3.0 sd = (1.20) n = 38 (t = .772)	$\bar{X}$ = 2.7 sd = (1.35) n = 16
C.A.	$\bar{X}$ = 99.4(Months) sd = (16.0) n = 38 (t = 1.010)	$\bar{X}$ = 104.9 sd = (23.7) n = 17

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APPENDIX E

Figure 74: ACHIEVEMENT GAINS FOR THE METROPOLITAN ACHIEVEMENT TEST FOR THREE YEARS BY GROUPS

			1971-72	1972-73	1973-74
Word Knowledge:	Group	I	.8	.2	.7
		II	.8	.6	1.2
		III	.8	1.0	1.1
	(Control)	IV	.9	.4	1.1
Reading:	Group	I	.5	1.1	.4
		II	.8	.2	1.1
		III	.8	1.2	1.1
	(Control)	IV	.8	.6	1.0
Total Reading:	Group	I	.5	.6	.8
		II	1.0	.1	1.1
		III	.7	1.0	1.2
	(Control)	IV	.8	.8	1.1
Language:	Group	I	.5	.7	1.0
		II	.6	1.7	1.0
		III	2.1	1.0	1.0
	(Control)	IV	.4	1.1	1.6
Spelling:	Group	I	1.5	.5	.7
		II	.9	.6	.9
		III	.4	1.2	.9
	(Control)	IV	.4	.6	1.2
Math Computation:	Group	I	1.0	.7	.7
		II	.8	.4	.7
		III	1.1	1.1	1.6
	(Control)	IV	.8	1.1	.5
Math Concepts:	Group	I	1.7	-0.1	.9
		II	.2	1.0	1.1
		III	1.1	1.0	1.2
	(Control)	IV	.9	1.0	1.1
Math Problem Solving:	Group	I	.6	.3	1.1
		II			.7
		III	.7	1.4	1.0
	(Control)	IV	.4	1.0	1.4
Total Math:	Group	I	.8	.3	.9
		II	.2	.9	.9
		III	.8	1.1	1.2
	(Control)	IV	.4	1.1	1.0

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ESEA TITLE III PROJECT

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APPENDIX F

CERTIFICATION BY VALIDATION TEAM (E3)

Name of Project: Hard-of-Hearing Child in the Regular Classroom

School District: Oakland Schools

Address: 2100 Pontiac Lake Road

Pontiac, Michigan 48054

We hereby certify that the above cited project

X is certified as being validated

___ is not certified as being validated

Date May 31, 1974

Signature of Validation Team:	Address and telephone number:
(1) [signature] (Chairman)	4209 Claridge Drive, Youngstown, Ohio 44511
(2) [signature]	2110 Elm Trace, Youngstown, Ohio 44515
(3) [signature]	2109 Burdett Avenue, Troy, N.Y. 12180
(4)	

Comments:

VALIDATION REPORT

PART I

Title page format

NAME OF PROJECT/PROGRAM

Hard of Hearing Child in the Regular Classroom

MAJOR AREA OF CONCERN

Special Education

PROJECT DIRECTOR

Robert L. Paul, Ph.D.

ADDRESS AND TELEPHONE NUMBER

Oakland Schools - 2100 Pontiac Lake Road, Pontiac, Michigan 48054
858-1892

L.E.A. SUPERINTENDENT

William J. Emerson, Ph.D.

VALIDATION TEAM

Dr. Frederick R. Ignatovich, Chairman
Dr. Mary Blair
Mr. Robert Amundsen

DATE OF REPORT

August 15, 1974

This project/program is certified as being successfully validated.

Frederick R. Ignatovich — 8/15/74

Validation Team Chairperson — Date

This project/program is certified as being unsuccessfully validated.

Validation Team Chairperson — Date

Educational Pacesetter Award

Presented to

Hard of Hearing

in recognition for contributions to experimentation, creativity, and innovation in education by the members of the President's National Advisory Council on Supplementary Centers and Services on the *12th* day of *July*, *1974*.

PRESIDENT'S NATIONAL ADVISORY COUNCIL
EXPERIMENTATION
CREATIVITY INNOVATION
ESEA Title III

Chairman

Executive Secretary

National Association of State Advisory Council Chairmen

Presents an

Excellence in Education Award

To recognize and commend the staff of

HARD OF HEARING CHILDREN IN THE REGULAR CLASSROOM

Oakland Schools, Pontiac, Michigan

for excellence in educational achievement by successfully meeting the ESEA Title III Validation Criteria of being exportable, having adequate cost information and evidence of effectiveness in improving learner performance.

December 11, 1974
Date

Roscoe Shields Jr
Chairman, NASACC